EDP industry report and market review

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" AUGUST 9, 1976 • VOL.12,NO.1 P.J.McGOVERN,PUBLISHER

Light, the latest link -- page 6

BURROUGHS 6800 SERIES COMPETES SQUARELY WITH 138 & 148, SUGGESTS FUTURE; BRAZILIAN MARKET GROWING, BURROUGHS IN STRONG POSITION

The sport of Burroughs watching may not be quite so popular around computer industry circles as that of IBM watching. But it can be equally challenging -- often in a different way -- and perhaps as rewarding. Good hints about the future more and more show up in practice with Burroughs announcements.

The case of the 6800 is a case in point. The press announcement -- filled with the sort of buzzword jargon Burroughs has become adept at over the last few years -- looked for all the world as if the numbering system selected actually told the whole story . . . that the 6800 was simply a replacement for the 6700, the remake of the 6500. Look at the language:

> The B6800s represent a new level in the evolutionary development of Burroughs advanced multiprocessor architecture and . . . can be configured with up to four central processors, four input/output processors, 16 data communications processors, and up to 15.7 million bytes of directly addressable memory.
>
> Large-scale configurations of B6800s will provide exceptional efficiency as central systems managing extensive on-line networks and large integrated data bases. Smaller configurations will facilitate the trend toward decentralized data processing by providing high levels of computer power at regional sites for transaction processing, data communications, and terminal network control.

Turns out, however, that the 6800 Series is highly modular. Two of three models announced -- the 6807 and 6811 -- are "basic systems" that "each have one central processor and one input/output processor." Also, for comparable memory sizes, the two smaller models are priced almost exactly along the same curves as the new CPUs and memory IBM announced as the 370/138 and 370/148.

At the upper, more touted end of the 6800 line, Burroughs announced the 6821, a multiprocessor constructed from two 6811s and using a new Trademarked "Global" memory that enables up to four CPUs to operate in either a "Multiprocessor" or a "Shared-Resources" mode -- i.e., as a single system or as separate systems.

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It's worth taking a look at some of the details of the Burroughs announcement, sifting through buzzwords in the process. The result not only helps explain what Burroughs is up to . . . it also indicates the sort of architecture that might be upcoming from IBM. Eventually, all mainframers will develop systems that are quite similar in function, if not in fact; and the closer they get to there, the more likelihood their paths will merge.

Processors, processors . . . everywhere

One of EDP/IR's favorite descriptions of future computer systems is a large, perhaps hierarchial memory surrounded by processors appropriate to handle user needs. They will also be transparent and compatible with previous systems.

Burroughs has gone a long way in this direction . . . even though some of the technology used may not be so sophisticated as that used by others. Memory, for example, is still core -- at just over 21¢ a byte and with a 325 nanosecond read time for six bytes. But it is the architecture, not the technology, that is important. That's what transparency implies. Features of the 6800 include:

Memory -- Each processor can have up to 3,145,728 bytes of main memory, and systems with multiple CPUs can have Global memory of the same size. Thus, a multiprocessor B 6800 system may be configured with up to 15,728,640 bytes of directly addressable memory.

Input/output processor -- Each central processor has an input/output processor -- that operates independently -- that, with its 20 channels and various buffers, can transfer data at the rate of 2.2 million bytes per second. The I/O channels simultaneously load data to and from peripheral devices and transfer data to and from memory.

Data communications -- Up to 16 data communications processors (DCPs) are available, and Burroughs says "each data communications subsystem has up to 393,216 bytes of high-speed memory and provides for network continuation, audit and recovery if the B6800 central system is unavailable. The DCP has a broadband control that allows it to handle data links ranging from 19,200 to 1.3 million bits per second; the broadband control operates asynchronously with the DCP but communicates at message level through binary synchronous or Burroughs Data Link Control procedures.

Reliability, maintainability, etc. -- Each 6800 has a microprocessor-based maintenance processor and display with diagnostic logic and instruction retry procedures; the power supply provides "brownout" protection against decreases in input voltage of up to 30 percent.

Nature of the beast

To Burroughs, an announcement in the middle range -- Size Class 4 and 5 as IDC categorizes computers -- is vital. These two pockets account for 60 percent of the Burroughs base versus 44 percent for IBM or the industry in total. It is hard, therefore, to understand why Burroughs almost hid the competitive nature of the bottom-end, uniprocessor 6800s. Of course, Burroughs doesn't have to tell the world what it is doing -- just its customers. It's actions, however, are important to watch. This is the company that brought us virtual computing, multiprocessing, the virtual machine . . . concepts that later made news when IBM "introduced" them! Now we have Global memory and lots of processors. Interesting.

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COMPARATIVE PRICES FOR CPU AND MEMORY IN UNIPROCESSOR B6800s AND IBM 138/148s

Model/Memory	Rent $/Mo.	1-Yr Lease $/Mo.	4-Yr Lease $/Mo.	Purchase $K	Maintenance $/Mo.
6807 @ 393KB		$ 8,700		$ 311K	$1,234
@ 786		11,500		395	1,584
@ 1179		14,300		479	1,934
6811 @ 786KB		$15,500		$ 648K	$1,750
@ 1179		18,300		732	2,100
@ 1572		21,100		816	2,450
@ 1965		23,900		900	2,800
@ 2358		26,700		984	3,150
@ 2751		29,500		1,068	3,500
@ 3144		32,300		1,152	3,850
138 @ 524KB	$ 9,600		$ 8,730	$ 350	$1,275
@ 1048	12,550		11,415	435	1,335
148 @ 1048KB	$19,000		$17,280	$ 689	$2,235
@ 2096	$24,900		$22,650	859	2,405

\+ + + +

BURROUGHS STACKS UP BIG IN BRAZIL, WORLD'S TWELFTH LARGEST MARKET

Several years ago, when computer industry pundits paused to consider the long-term outlook for various parts of the world, there usually would be a "And don't forget Brazil!" comment at some point in the discussion. Even as the 1970s began, the largest South American country was understood to be important in the scheme of things at IBM's World Trade Corp.

Now some of the facts are in. And if the trends established in the data reported for the year ending at mid-1975 are indicative of the most recent year's results, there probably are some 5,000 computers installed in Brazil. This means that the South American country is in the process of vying with Australia as the Number Three non-European international free market (behind Japan and Canada). It's a country well worth watching.

In what is defined as the minicomputer area (CPU and memory prices at less than $30,000 in the United States), non-U.S. companies have about half the market. In other categories, the list of competitors looks like a U.S. lineup, even though Honeywell-Bull replaces HIS and the Siemens name is associated with Univac as it once was in Europe. In all size categories, minis included, Burroughs shows up extremely well.

The latest figures available come from a Brazilian government agency, the Coordinating Committee of Electronic Processing Activities. They show minis up 43% and all non-minis up 29% (by number) in the year ended July 1, 1975. And this growth comes despite Brazil's heavy tax system and a "previous deposit system," which requires that a no-interest deposit of the full value of an item to be imported be deposited with the Brazilian government six months in advance. These factors mean that Brazilian customers pay a whopping 192% of the U.S. FOB price. Even so, the statistics about the Brazilian market are impressive:

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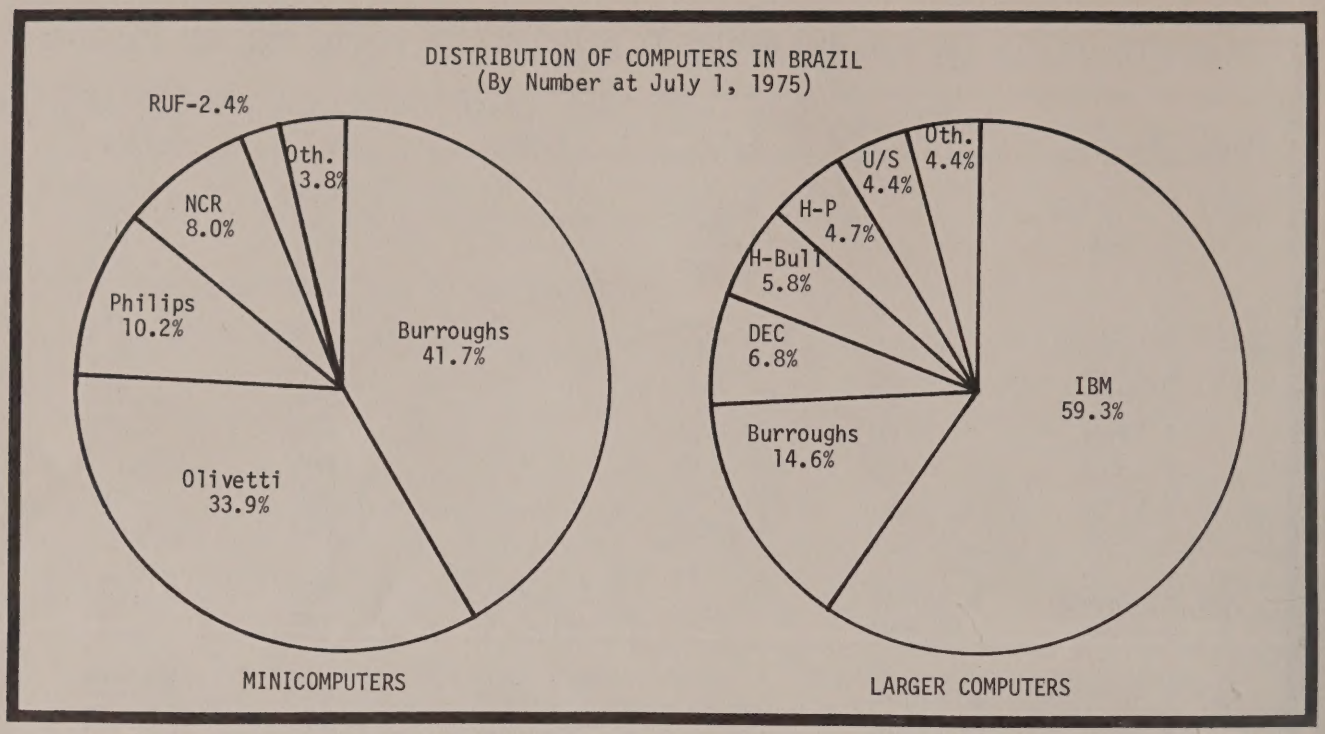

- The total number of installed computers was 3793, a net increase of 37% from the 2772 installations recorded in the July 1974 report data.

- The total import value of data processing equipment for 1975 was $375 million, according to the agency.

- By its own count, Brazil now has 65% of all the computer installations in South America and is in twelfth place worldwide.

The chart shows the distribution, by manufacturer, of minicomputers and larger classes. Brazil reports computer installations in five size classes, based on U.S. FOB price for CPU and memory, that break down as follows:

Minicomputer	-- less than $30,000
Small	-- $30,000 -- $180,000
Medium	-- $180,000 -- $600,000
Large	-- $600,000 -- $1,200,000
Very large	-- over $1,200,000

The installed counts by manufacturer are shown in the table. Some additional comments provided by the Brazilian agency are:

Very Large -- Although they represent only 1.6% of the total number of installations, this group is the fastest growing segment of the marketplace. About half the computers are owned publicly, half privately. In more detail, government-controlled corporations own 34%, the government itself 10%, public schools 10%; in the private sector, industry uses 18%, institutions in commerce account for 13%, and financial institutions use 15%. Looked at by manufacturer, IBM has supplied 77% of this field, Burroughs 18%.

Large -- Over the last two years reported, the growth rate for installations of this size machine has fallen off. The 1974-1975 rate was 14%, compared to a 60% increase the previous 12 months. It is, however, the only market category in

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COMPUTERS INSTALLED IN BRAZIL
(Number of Computers, by Brazilian Government Size Class, at July 1, 1975)

Manufacturer	Mini	Small	Medium	Large	Very Large	Total
Burroughs	944	119	86	7	11	1167
IBM	0	625	162	72	47	906
Olivetti	769	0	0	0	0	769
Philips	232	0	0	0	0	232
NCR	181	8	9	1	0	199
DEC	0	101	2	0	0	103
Honeywell-Bull	0	43	42	2	2	89
Hewlett-Packard	0	72	0	0	0	72
Univac/Siemens	0	45	22	0	0	67
RUF	54	0	0	0	0	54
Singer	20	19	0	0	0	39
Commicromation	33	0	0	0	0	33
Varian	23	0	0	0	0	23
Facom	2	14	6	0	0	22
CII	0	6	3	0	0	9
Wang	8	0	0	0	0	8
Control Data	0	0	0	0	1	1
TOTALS	2266	1052	332	82	61	3793

which IBM has increased its market penetration since 1973. The major U.S. mainframer has 88% of the number of computers installed in this size class; Burroughs comes in second with 8.5%.

Medium -- This size class, also, has reported a decreasing growth pace, but it is less marked as the Large class. Medium computers installed increased 12% by number in the 1974-1975 year, compared to 28.5% in the prior 12 months. Interestingly, a relatively wide diversity of machines is installed: IBM had 49% of the base, Burroughs 26%, Honeywell-Bull almost 13%, and Univac/Siemens about 7%. The public/private split is one-third/two-thirds.

Small -- As would be expected in a developing marketplace, the installed base of small computers is increasing rapidly. The 1974-1975 rate of increase in base was 36.2% compared to 22.3% for the prior year. Some of this increase is due to a government reclassification of some computers from the mini category to small, but the actual rate, the Brazilian agency says, is still considerable. For the computers in the small size class base, the public/private split is 30:70. IBM accounted for 60% of the market; Burroughs had 11%; Digital Equipment 10%; Hewlett-Packard 7%; Univac/Siemens, Honeywell-Bull, and Others had 4% each.

Minicomputers -- This size class -- which includes electronic accounting machines and visible record computers (as termed by U.S. or European standards) -- grew almost 43% during the most recently reported year, despite the recategorization mentioned in the Small category. In this size class, Burroughs was the clear leader, with 42% of the machines installed. Olivetti was a strong second with 34%, Philips accounted for 10%, NCR had 8%. Eighty percent of all minicomputer installations are privately owned.

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Light reading for the summer

'MA BELL' TESTS A NEW LIGHT WAVE COMMUNICATIONS SYSTEM
AS LIGHTGUIDES HIT THE MARKET, FIND FIRST APPLICATIONS

Beneath the streets and manholes of Atlanta eerie, pulsating beams of laser light race through gossamer-thin glass fibers installed experimentally by Bell Telephone Laboratories . . . in Manhattan, some cable television subscribers take advantage of glass cable that has 25 times the capacity of Teleprompter Corporation's conventional coaxial cable . . . and in Sturbridge, MA, a three-year-old company is selling the stuff as an off-the-shelf, standard item.

Light wave communications -- via lightguides -- is finally leaving the labs and heading for the streets (or under them). So as the results of these initial tests provide feedback for suppliers, a whole new revolution in telecommunications may well begin to take shape!

The superior properties of light as an electromagnetic transmitting medium -- high frequency, wide bandwidth -- have been known for decades. But practical applications have lagged until recently for want of a decent light source and a pure enough transmission medium. But with the availability of the laser in the 1960s and later the light-emitting diode as possible light sources, the impetus was there for Bell Labs, Corning Glass, and others to search for a proper medium.

And since 1970, when Corning capped seven years of research with a glass fiber that had low enough light loss to compete with conventional cable, the race has picked up speed. And pacing the race have been semiconductor advances at the transmitting and receiving ends.

A digital affair

This combination of a cost-effective medium and the electronics to match -- a duo that is approaching the practical stage -- allows light wave communications that offers some heady advantages over conventional ground wire transmission:

- Light beams can transmit many times the amount of information as conventional cables or even microwave guides. In the Bell Labs experiment, a single, half-inch cable can carry the equivalent of 50,000 telephone calls. And Corning researchers have demonstrated a hair-thick glass fiber that can carry the equivalent of 33,000 calls over a distance of six miles.

- Light transmission is immune to normal electrical crosstalk or the static interference caused by lightening, sun spots, etc. And as fibers become more and more optically pure, the need for signal "repeaters" will drop. In the Bell Labs experiment, the signals hold up for four miles before repeating . . . further than the distance between many big city switching stations.

- Light cables -- manufactured primarily from inexpensive and abundant silica -- will be replacing cables made primarily of copper . . . a material that is growing both scarcer and more "political" every day. It is quite possible, analysts say, that the value of the metal replaced by light cables would actually pay for (or pay a large portion) the conversion to glass.

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- Light transmission turns out to be a digital affair . . . a phenomenon that meshes well with the astronomical growth in demand for digital methods of transmission. Looking further toward the future, researchers see the development of "integrated optics" -- the thin film optical equivalent of integrated circuits. These will facilitate the interfacing of light wave systems with communications endpoints . . . and the development of switching capabilities.

There are problems, of course, and the first is cost. Less than a year ago a six-fiber cable from Corning, produced in pilot quantities, cost $13.50 a meter -- which, considering the amount of information six fibers can transmit, may not be too bad. And there is no question but that cable costs will go down dramatically as suppliers go into volume production. A Sturbridge, MA, fiber optics vendor -- Galileo Electro-Optics Corporation -- peddles its cables at 4¢ to $1.00 a foot, depending on the purity (which affects transmission distance) needed.

Another problem that a nascent lightguide industry will face is that of simply training engineers and repairmen in the idiosyncracies of the new and different medium. Also, bucking the entrenched wire and cable industry may prove to be no easy task. But in the latter case, AT&T's commitment to light wave communications will provide the cable companies a certain amount of motivation to explore the vagaries of the new technology.

Beam fever

AT&T and others expect the first use of light wave systems to come where geographical distances are short . . . in switching centers, between urban switching centers, in urban cable TV, in video production facilities, inside aircraft.

But if there is a "natural" foster parent for the young technology it has to be the computer industry. In the short term, lightguide transmission would seem appropriate between CPUs and peripherals or terminals -- where large amounts of data must move over short distances in a hurry -- or in process control systems in electrically noisy environments. Later, as "integrated optics" takes hold and computer architecture becomes more modular and distributed, light wave electronics could penetrate even deeper into the computer as well as between more of them.

Computer users, of course, should be early and avid customers for any digital light wave transmission services offered by the common carriers.

AT&T says its Atlanta experiments are helping it "to prepare this new technology for possible widespread use in the early 1980s." If Bell does put the push on -- and some of those underground conduits are getting pretty crowded -- it will be interesting to see:

+ How Ma Bell implements the new technology, i.e., where the first usage will surface, which competitors will be affected, etc.

+ What a radical telecommunications technology bodes for other budding technologies . . . such as SBS's proposed new satellite service . . . that should be shifting into high transmission gear in the early 1980s.

Will light wave technology really revolutionize the telecommunications industry? Well, once vacuum tube salesmen asked the same question about an experimental device out of Bell Labs . . . called the transistor . . .

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• IN A RENEWED EFFORT TO KEEP COMMON CARRIERS OUT OF DATA PROCESSING except via totally separate subsidiaries, the Federal Communications Commission has -- shades of the late 1960s -- launched a second Computer Inquiry. It would apparently rethink the original Inquiry that found data processing services to be competitive with no need for regulation (EDP/IR Apr.9,1970). The FCC said it would eliminate a creation of the first Inquiry -- the concept of "hybrid" operations -- and would define data processing as ". . . the use of a computer for the purpose of processing information wherein: (a) the semantic content, or meaning, of input data is in any way transformed, or (b) where the output data constitute a programmed response to input data." Three types of operations would be included in the FCC's proposed definition: [1] "Arithmetic processing -- general commercial accounting, payroll, inventory control, banking and point-of-sale processing, financial and econometric modeling, scientific calculations, etc."

[2] "Word processing -- ... interactive information retrieval systems, management information systems, text editing, translation, typesetting, etc."

[3] "Process control -- ... where a computer is used to monitor and control some process which is occurring continuously -- such as a nuclear-powered generating station, an electric power distribution grid, an automatic machine tool or a fire detection and control system."

A carrier could not offer any of these data processing applications, says the FCC, except under "maximum separation conditions" -- those being via a separate DP subsidiary that has its own books, officers, operating personnel, and computer facilities completely separate from the carriers.

• PUBLIC EXCITEMENT -- OR MORE MISUNDERSTANDING -- about computers could swell this fall as General Motors introduces its electronic spark timing system based on a Rockwell International microcomputer that GM says is the "first . . . onboard digital computer . . . in a production automobile." A standard in the 1977 Oldsmobile Toronado, the MISAR (Microprocessed Sensing and Automatic Regulation) system will "continually adjust ignition timing for the best fuel economy, driveability, and emissions performance . . ." Once computers are "aboard" cars, says GM, many other things are possible -- digital readouts, anti-skid braking, etc. The Misar is made of two LSI chips -- a 10-bit processor and a 10K-bit ROM -- plus sensors on the engine to constantly measure vacuum, coolant temperature, engine speed, crankshaft position. Feedback will eventually be added.

• INCREASING THE "MAKE" VERSUS "BUY" PORTION of its minicomputer systems, Data General has announced a four-member family of terminal printers, including what it claims is the first 60 character-per-second terminal printer to be manufactured by a minimaker. The new printers can be used with computers where teletypewriters are used. DG makes its own magnetic tape drives, certain disk drives, paper tape readers, and CRT displays; it says peripheral products represent more than 50 percent of the content of its systems. Another first claimed by the Southboro, MA, minimaker is the use of high-density MOS memory to put 32,768 words of storage on a single printed circuit board in its new Nova 3/D. It runs unrelated programs simultaneously and can support up to 131K 16-bit words of memory.

• THE FIRST OF SEVEN 16-BILLION-BYTE modules of 38500 mass storage has been shipped by CDC to Lawrence Livermore Labs to support the Octopus timeshared network built around four 7600s and two CDC Star-100s. The CDC MSS will supplement 80 disk drives, 36,000 tapes, and a trillion-bit IBM photo store device.

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UNIVAC AND BURROUGHS JOIN INTERMEDIATE SYSTEMS FRACAS AS IBM AND HONEYWELL 'ADJUST' MAINTENANCE PRICES

All of a sudden there's a whole new market in the middle of most mainframe lines.

As summer evaporated, one after another of the major mainframers maneuvered pricing and position as August ended and a late post-Labor Day fall was set to begin. It was as if the summer had been spent studying the new systems IBM had announced for the Nation's 200th Birthday (EDP/IR July 22, 1976) . . . and a new posture had to be assumed. During the last two weeks:

- IBM announced "adjustments in contract maintenance charges and hourly service rates." There were a few decreases, effective immediately, and increases of 10% to 15% on maintenance for older CPUs and peripherals plus 5% to 10% on small System/370 computers, for example, effective the middle of November.

- Honeywell followed IBM in "adjusting" computer prices, increasing its maintenance charges 7% to 15% as well as upping rental on Series 200, Series 2000 and leased Xerox computer equipment by 2.5%.

- In perhaps the most significant of the recent announcements, Univac combined new pricing with "productivity gains" to shift the position of its medium-sized Series 90 mainframes as significantly as IBM did in announcing the 370/138 and 148 two months earlier.

- Burroughs, tidying up its product offerings in the wake of its new 6800 series (EDP/IR Aug.9, 1976), reduced memory prices for its medium-scale 2800, 3800, and 4800 systems, also expanding the capacity of the smaller two to the megabyte size.

The maintenance increases (and Univac posted one earlier in the year) reflect the labor content of computer systems, and are to be expected. The new pricing plans from Univac and Burroughs definitely reflect the learning curve economics of semiconductor production -- IBM's if not their own. In any event, the net result is a whole new pricing structure for a new, megabyte-sized middle-of-the-line breed of mainframes.

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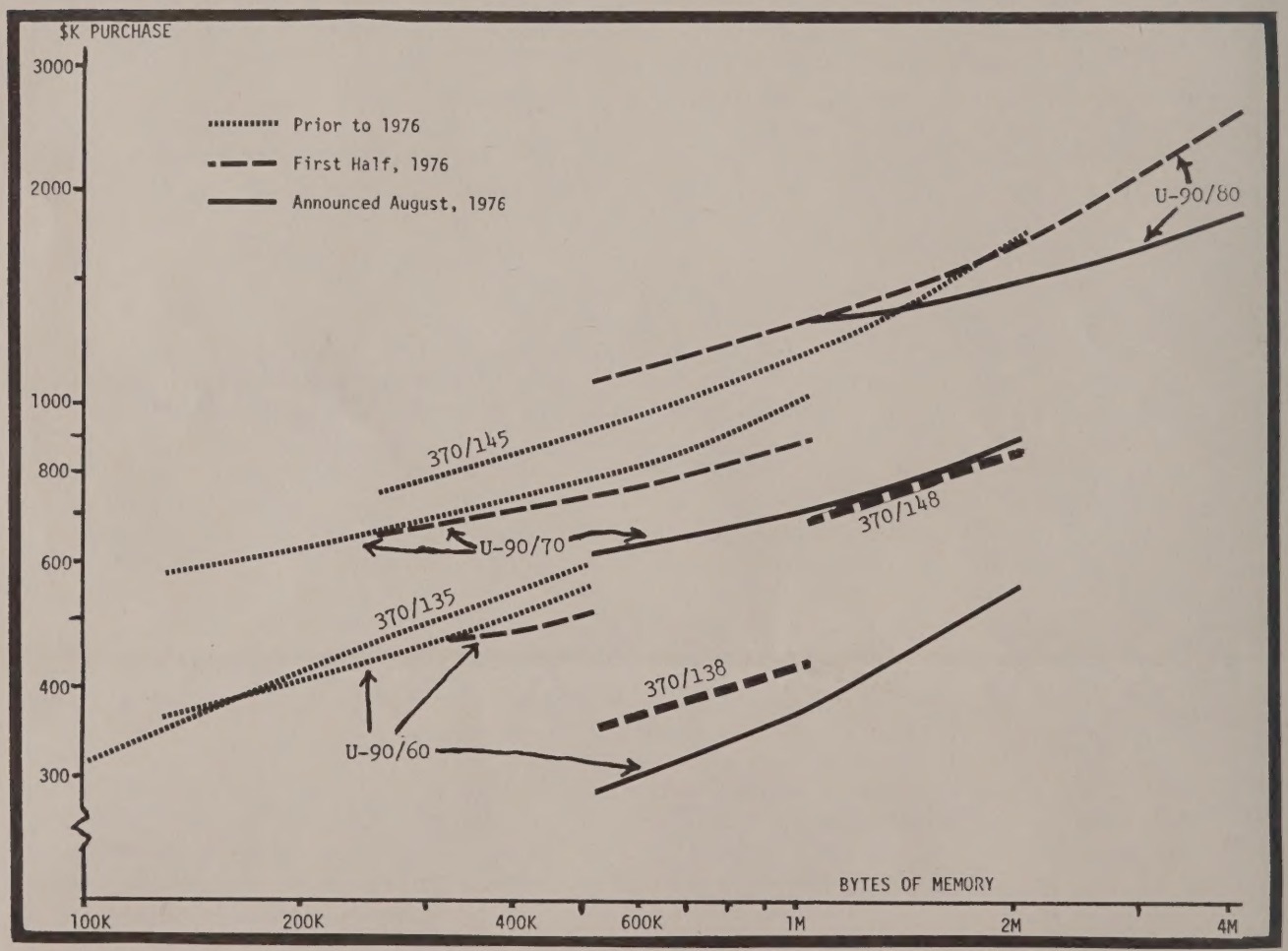
Follow the leader . . . down

It's actually academic whether "recent advances in memory technology coupled with a series of productivity gains in its development and manufacturing operations" were the primary factors that allowed Univac to reduce prices on its Series 90 computers . . . or whether the company is forced to ride the skids of IBM's MOS learning curves. The result is the same. Univac's intermediate range once again is competitive with IBM's:

- The 90/60 now comes with a minimum main memory of 524K bytes, the old maximum. It uses 4K-bit MOS chips and will supply up to 2 megabytes in 262K-byte increments. Additionally, Univac is offering an enhanced processor -- available as a feature to current users -- that it says will provide a 25% increase in instruction execution speed. Purchase price of a 524K-byte memory/CPU complex is $284,184, 45% below the previous purchase price. The five-year lease price is $7894, only 1/36th the purchase price.

- The new 90/70 starts at 524K bytes and goes to 2 MB (versus 1MB previously) in 262K increments. Purchase price is about 25% lower.



UNIVAC'S LATEST PRICING MOVES (solid lines), combined with performance improvements, bring its middle range Series 90 Models 60 and 70 back into direct competition with IBM's new 370 Models 138 and 148. Megabyte MOS memories characterize the new mainframes that are priced to encourage purchase by users

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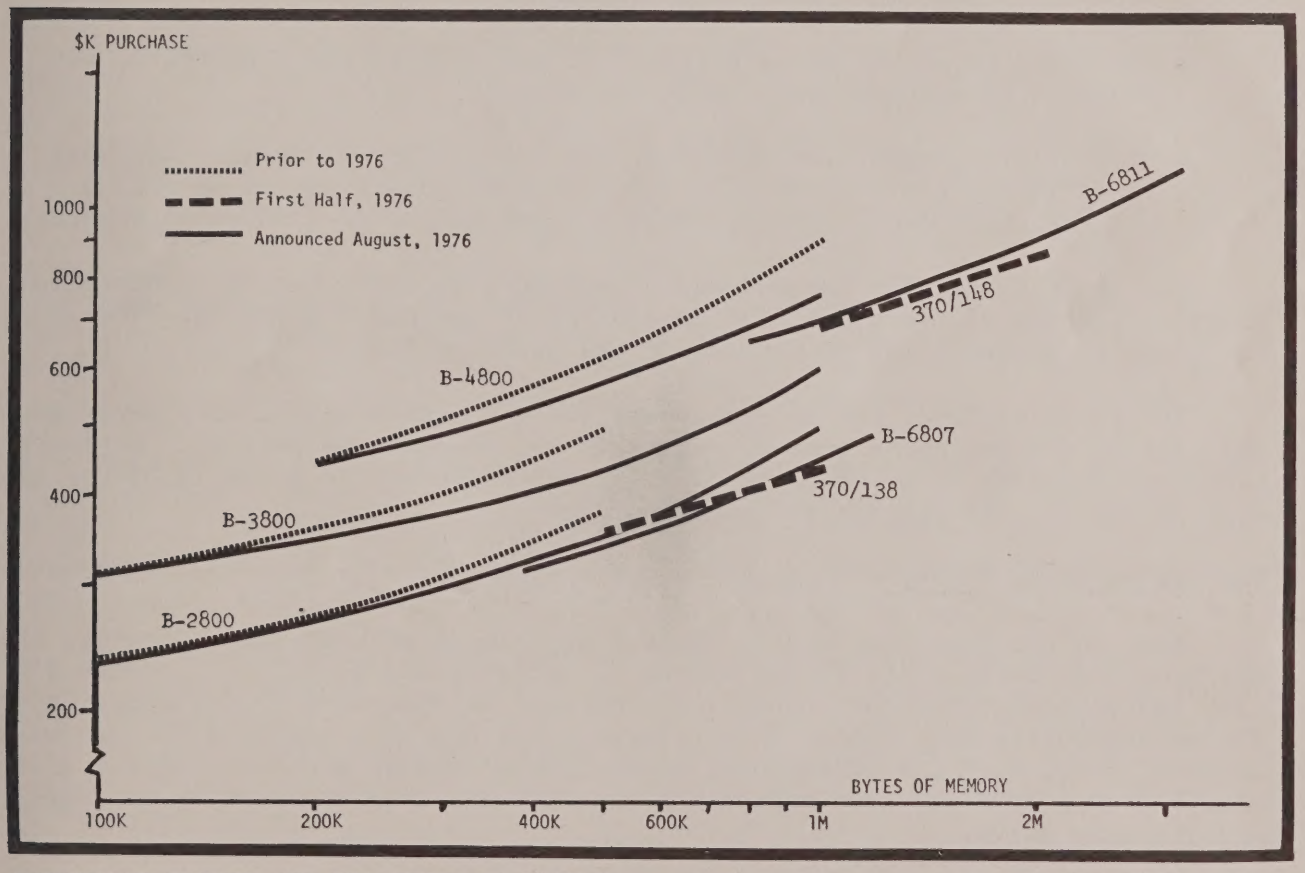
- Univac says the 90/80 was announced with the 4K-bit MOS main storage, but it is reducing prices above the 1 megabyte level . . . lots. The purchase price for 524K increments above 1 MB have been reduced 57%! Even so, at $96,300 they cost more than IBM's $170K/MB current price.

As a result of its pricing modifications, Univac says its 90/60's price/performance ratio places it competitively in the gap between the 138 and 148, and that the 90/70 and 90/80 now bracket the 148, offering the prospective user considering acquisition "two very attractive alternatives." Univac also points out that it offers a "smaller granularity of main storage increments" and therefore that prospective users don't have to take more memory than they want.

Burroughs tidies up its offerings

Most of the recent pricing announcement from Burroughs is summarized in the graph below. Because of "significant reductions in the costs of MOS and bipolar memory circuits," the company says, main memory modules on its medium-scale systems are reduced immediately. The reductions apply to both lease and purchase prices. On the 2800, purchase is reduced from 19% to 27%, lease from 10% to 19%; on the 3800, purchase is reduced from 28% to 37%, lease from 8% to 19%; for 4800 systems, all purchased memory is reduced 31%, all leased modules are now 21% less. The 2800 and 3800 have MOS memory and can now be expanded from 500KB to 1 MB; the 4800's capacity remains the same with 1 MB of bipolar memory.



BURROUGHS TIDIED UP ITS PRODUCT LINE by reducing memory prices on its 2800, 3800, and 4800 CPUs and extending the lower two to one megabyte capacity. This brings these aging machines more into line with the low-end models of Burroughs' recently announced 6800 Series, the new products in the transformed middle market

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Some offsetting increases?

The maintenance price increases IBM announced at mid-month should have come as no great surprise, because the maintenance prices of the latest CPUs -- the 138 and 148 -- were considerably higher than for the predecessor equipment. On the 138, for example, maintenance charges worked out to be about 4 percent of the purchase price per year (3.5 percent for the 148) versus about 2 percent for the CPU and memory on the 135 and 145.

In announcing the price increases, IBM said that they would not apply to any product first shipped during the 12 months prior to August 16, 1976. Also, the company took the effort to point out that monthly maintenance for 153 products were to be increased 5 to 15 percent while monthly maintenance charges for some 40 products would be reduced 5 to 20 percent. An examination of the full list shows the following major maintenance changes:

- Old CPUs -- the 1401, the 360/50, 65, 67, and 75 -- got the 15 percent increase as did a few other major products such as the 2420 tape drive, the 1403, 1404, 1443, and 3211 printers.

- Other old CPUs -- the 360/30, 40, and 44 -- got the same 10 percent hike IBM applied to the 370/125 as well as the 3420 tape drive, the 3704 and 3705 communications controllers.

- The other major CPU to be affected is the 370/115 (up 5 percent); the 360/91's maintenance was reduced 10 percent.

- Disk drives ranged over the lot: the 2311 is up 10 percent, the 2314 is up 15 percent but the 2313 and 2318 configurations are up only 5 percent; the 3340 is increased 15 percent while the 3330 is unchanged.

And so it goes. The large count of products in IBM's analysis comes from the detailed listing of every model of each piece of equipment involved. The 370/125, for example, accounts for 50 entries in the detailed list.

In all likelihood, the increases are based on IBM's maintenance experience and reflect the increased cost of materials and manpower to perform. On the other hand, any increase in maintenance of purchased equipment is a subtle bit of pressure on the user to upgrade to newer equipment.

The new megabyte middle

Back to the important stuff. This year, almost without prior warning, there has been a dramatic shift in the lineup of medium-sized mainframes. Users now can have two to four times the capacity at the same or lower cost. Obviously, as all the manufacturers have stated (don't forget that NCR is positioned in this market segment, also, with its Criterion), production economies are bringing the cost of memory down. It's the same phenomenon that brought down the cost of calculators: the learning curve.

The learning (or experience) curve was discovered as an empirical relationship between aircraft mainframe production and costs during World War II. Subsequently, the automotive parts manufacturers and, principally, Texas Instruments, applied it to other applications. It especially well fits semiconductor production, and "guarantees" that memory -- and CPU -- costs will continue to plunge.

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The mainframers don't want average system prices to decrease all that much, so that's one good reason they continue to add memory capacity.

In addition, as EDP/IR has pointed out previously, one of the primary solutions to the software problems around today is to "dump memory on them." As memory gets cheaper and cheaper and users have more and more, programmers can be sloppy and still make some headway. This is not necessarily to be desired, but may well be the primary route for some years to come.

Finally, the trend is toward the use of data base management systems and the management techniques -- as well as additional need for memory -- they imply. So EDP/IR wouldn't be surprised to see additional hardware designed especially for these applications. With the plunging price of memory shifting the curves ever to the right, we wouldn't at all be surprised to see IBM introduce a system in the 158/168 price range . . . but with several times the memory. This data base management system just might start with 4 or 8 MB of memory, plus have loads of internal control memory to handle the microprogramming. Just speculation . . . but it's one way past the hurdle the withdrawal of FS might have put up. But that's another story (see below).

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Book review

400+ PAGES OF INSIGHT, PLUS A LITTLE BIAS -- MALIK'S OPUS IS FASCINATING!

> To understand computing one must understand IBM. To understand IBM one must understand IBM's technological record. This is necessary because the changes that are being brought about in society which can be attributed to the installation of computers are changes often attributable to IBM technological and marketing possibilities, plans and moves -- not to the possibilities inherent in the computer *per se*. It has been so in the recent past, it is likely to be so for the foreseeable future.

Toward the conclusion of AND TOMORROW ... THE WORLD? INSIDE IBM, Rex Malik makes the above observation. It's like much of his book published in Britain last year but not until recently available in the U.S. -- opinionated, to be sure; but so filled with insight that it's must reading for those who watch the industry.

The book began, Malik tells us, as an attempt to digest all the documents about IBM that came to the surface during the Telex trial. It does a superb job of this, and many readers will be grateful that Malik had his period of convalescence in 1973 to read the thousands of pages of management minutes. As a digest of these pages alone, TOMORROW? is well worth reading.

But there is more. Malik combines this with a reasonable history of computing and a synthesis of scores of interviews with IBM, ex-IBM, and other computer industry people. For the most part, he writes well, whether descriptive or opinion. Indeed, Malik's opinion of IBM is nowhere clearer than in the chapter -- "A Lawsuit a Day keeps Justice at Bay" -- that he begins with a quote from Ian Fleming's *Goldfinger:*

> "Mr. Bond, we have a saying in Chicago. Once is happenstance, twice is coincidence, the third time it's enemy action."

Several times following this quotation Malik brings up Goldfinger as if to say "don't forget the theme of the book." The first time he picks up on this, however, he leaves no question as to his opinion:

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> Had Goldfinger ever examined a listing of IBM's brushes with Sherman *et al.*, he would long ago have come to the conclusion that what they say in Chicago has even more to commend it than he might originally have thought. He would no doubt have appreciated the skill with which the law has been used; how IBM has seemingly circumvented its intent; how, in fact, justice has not been just blind, but also seemingly deprived of all her other senses. Indeed, on examining the record he would, one suspects, have come to the conclusion that he was in the wrong business. For over the years a pattern of lies, evasion, half-truths and deception has been allowed to flourish with almost no penalty, and IBM has been permitted to continue to build and grow with seeming impunity.

The answer is none

In addition to presenting much of the evidence uncovered in the Telex case (to illustrate points about IBM and the computer industry), Malik looks at the legal process itself. The contest between Telex and IBM, he says, is interesting "because it tells us a lot about how IBM operates when faced with serious competition. It is interesting too because the Telex trial was also used by IBM as a test bed for its legal machine; it is almost a rehearsal for U.S.A. versus IBM." He describes the computer system that backed up IBM's trial team . . . a system that handled free text and gave IBM the ability to find not only "glaring discrepancies between testimony and submitted evidence, but also the less obvious contradictions, and that almost as a matter of routine."

Malik warns that would-be plaintiffs against IBM had best do their homework: "Those who have ambitions to sue IBM must be prepared not only to meet with the IBM mechanics, they must also prepare themselves to face an organisation which will use every method that comes to hand and which has the resources to make things happen." He has a pensive observation about IBM's biggest hassle:

> To watch the case of Justice versus IBM in action is much like watching a bumbling small weak man trying to fight a strong, cunning and clever big man, with the difference here that the Federal Government is cast in the first role. . . . But, and now we come to the other hand [of the imbalance]. The question has to be asked -- and answered. Is there any way that the weakling can lose. The answer is none.
> . . .
> Even with minimal growth . . . one could expect that IBM would be a twenty billion dollar corporation by 1980 and a forty billion dollar corporation by 1990. . . . Those $20 and $40 billion minimal projections indicate in themselves that something will be done: there is no case in history of any commercial entity or corporation being allowed to grow so hugely in any field significant to society without its being brought under political control. . . . [The computer industry] has too much importance for society to allow it to be dominated by any one company, however well run.

The IBM system

One of the more important observations about IBM that Malik makes, supports, and drives home is that IBM still is run by only a handful of people. It is possible to be near the top, Malik says, with 'responsibilities' for tens of thousands of people in a division doing hundreds of millions or billions of dollars

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worth of business . . . "to be listened to by the outside world and respected, even feated by many of the more than 260,000 IBM employees hierarchically ranked below; and yet to have no real power at all."

The power in IBM is the Corporate Office . . . "absolute, almost unfettered by what happens elsewhere within IBM. . . . To get a position of power within that office, and thus within the Corporation, demands more than ability or the capacity to perform: . . . what you have to do to succeed in IBM is to pick the right master -- you hitch your career to someone else's."

"The only power held by the IBM executive outside the Corporate Office is the power not to make mistakes; to execute, not to initiate."

"The IBM system . . . is a highly structured one, in which there is a date for everything, a time limit in which work has to be completed, and that time limit is set by the next meeting, presentation, report. Of course, there is just never enough time. . . . It is a system that eats up resources, and it eats up people. [It is]a world without one of the key business satisfactions . . . that of personal achievement (and personal failure). There are no entrepreneurs in IBM, and no one will make a fortune as the direct result of his own decisions -- until he reaches the very top. The system works, but it can lead to a considerable dissatisfaction, which also can reach quite near the top."

"IBM is littered with former Presidents of this, that or the other division who are now stuck in back rooms ranking number three or four to men who used to be their assistants. It is one of IBM's strengths that it encourages its executives to take a chance. If they fail, they are demoted and sent to the 'penalty box' . . . [but this] does not necessarily mean a cut in salary."

MIS . . . the IBM way

IBM likes its unpleasant conclusions gift wrapped, if possible. When it comes to dismissing people, euphenisms abound, says Malik. "Nobody is ever fired by IBM; instead they are 'released from the business' or 'involuntarily separated.' And MIS does not . . . stand for Management Information System, but rather for Management Initiated Separation."

> Non-concurrence, of course . . . means 'I do not agree'. However, to non-concur is only one of three formalized degrees of dissent possible, and at that not the most powerful, though the most public. At the bottom comes 'concern'. . . at the top end of the scale comes dissent itself. . . . Anyone in IBM with the right to non-concur is on the way to the power of dissent.

The past of Future Systems, *et al*

Malik devotes a considerable amount of space to technology. He describes in detail the Future Systems of Telex evidence vintage, and discusses the demise of FS. (He is the journalist credited with first discovering this.) It is a thoughtful discussion of where the technology eventually will lead. We agree that "the computer business is now at the heart of a complex of skills, techniques and machines . . . in a critical position among the world's three most essential fields of activity (the other two being energy and food)." We also disagree with some of Malik's observations. But our thoughts are sharper as a result of this book. Recommended reading. -- *James Peacock*

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• DATRAN'S DEMISE IN THE DATA TRANSMISSION DERBY sparked questions . . . about the nature of "competition" in the communications industry . . . about even the possibility of survial for parent Wyly's service company, UCC. Some of the questions have brewed since at least spring, as Wyly began a series of moves designed to save Datran.

A refinancing plan with Haefner Holding AG, Zurich, brought in $47 million and is thought to have halted the pending sale of UCC banking services to Boeing Computer Services. Then, on June 18, Wyly announced that it was hunting for a Datran buyer. But no. So, on August 19, Wyly announced that Datran "will commence the orderly phase-out of its data transmission services." The FCC met Aug. 26 and ordered Datran to remain in service for another 30 days so that customers could make an orderly transition to a different carrier . . . but the dye was cast, and Wyly Corp. filed a voluntary petition for bankruptcy on Aug. 29.

According to a company statement, AT&T is the villain: Wyly has filed a $285 million antitrust suit. Wyly charges that "AT&T possesses monopoly power in the provision of data transmission services in violation of the Sherman Act and has used this monopoly power to impose predatory rates and practices to block competition."

Sam Wyly, chief executive officer of Datran, says the problem has also been the attitude of users who are aware of the power of AT&T: "AT&T has persistently fostered a 'wait and see' attitude among the users of specialized services such as Datran provides. . . . The AT&T monopoly has had [a severe impact] on the development of Datran as the vigorous business enterprise that we intended to become." Some sources say the suit is well founded . . . and wouldn't be surprised at a significant settlement. The major concern around computer industry circles is the future of UCC. Best bets at presstime were that this services subsidiary would be sold -- probably to another service company -- to supply some funds for holders of Datran's financial paper.

• WASHINGTON WILL NO LONGER HAVE TO COPE WITH TWO CIAs. Jack Biddle, president of the Computer Industry Association, admitted the association's initials had perhaps caused some "interesting confusions" since the move to the Washington area. But he credits the growing interdependence of the computer and communications industries with the real reason behind the name change to Computer & Communications Industry Association (CCIA). "The impact of any significant development upon the opportunities for the growth of our member companies is identical to the impact upon the independent manufacturers and suppliers of communications equipment, facsimile devices, terminal equipment, and the specialized common carriers." On the same late August day as the name change, the CCIA elected Dr. Gene Amdahl, chairman of his plug-compatible CPU company, chairman of the association. The CCIA says Amdahl's acceptance indicates the importance he places of the association's role in fostering the competitive environment necessary in the industry.

• THE COMPUTER HOBBYIST MAY BE MOVING FROM NCC DIVERSION TO IMPORTANT CUSTOMER. Shops aimed specifically at hobbyists are springing up all over -- at last count there were 50, one of which bragging 7500 square feet. The number of clubs is approaching 100. And even "journals" are appearing: "Dr. Dobb's Journal of Computer Calisthenics & Orthodontia (Running Light Without Overbyte)" sports a $1.50 cover price and 44 pages of reference material for home computer users. The same publisher -- Peoples Computer Co., Box 310, Menlo Park CA 94025 -- issues the People's Computer Company Newsletter. A number of mini- and microcomputer companies including IMS, Southwest Technical Products, and Lear Siegler have kits for hobbyists.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" SEPTEMBER 17, 1976 • VOL.12,NO.3 P.J.McGOVERN,PUBLISHER

Used Computers: Supply and Demand -- page 4

MINICOMPUTER FUTURES REST HEAVILY ON SMALL BUSINESS AND DISTRIBUTED PROCESSING; DATA GENERAL INTRODUCES SYSTEM FOR SOPHISTICATED END USERS

In preparing their positions for a most important niche in the total marketplace, minicomputer industry leaders are moving to shore up positions -- or stake them out -- in the end-user sector. On a dollars basis this portion of the market is expected to grow 4 times to the $3 billion level during the next five years, despite the fact that the number of OEM units shipped will zoom from 30,000 to the 130,000 level in 1980.

Two significant trends are involved: The microprocessor, available from the large electronics manufacturers, is already replacing minis in some applications (although most microprocessor use is in entirely new applications, assisting other computers or giving some intelligence to previously "dumb" products); in addition, the user trend toward distributing computing coupled with the growing demand for computer power at smaller businesses is developing a substantial market for the supercomputer. The market for traditional minicomputers, in fact, will remain quite stable during the remainder of the decade.

Minimakers, if they are going to take advantage of the second phenomenon described above, must increase their visibility among potential customers. Earlier this year, EDP/IR's publisher, International Data Corp., surveyed the extent of minicomputer awareness among the top-level data processing decision makers and probed for future needs. Results from the survey indicated low visibility for minimakers, but large potential. Three conclusions emerge:

- As these large (Fortune 1000-type) organizations increase their mini sophistication, they establish more savvy buying patterns, including centralized buying centers that do comparison shopping and look at what is available, including the possibility of third-party peripherals.

- Commercial applications will be the mainstay of minicomputer growth. Therefore, software offerings become more important and the market for disk drives associated with minis will increase rapidly.

- Distributed processing is uppermost in users' minds, but the methods they tend to use for implementation is by no means clear.

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The result of this marketplace attitude will make for increased business -- for today's industry leaders and/or new forces that recognize the trends. Measurements by IDC indicate an astoundingly high compound five-year growth rate of almost 30%, with the minicomputer/miniperipheral business for U.S.-based companies hitting the $5.5 billion mark by 1980.

In the process, natural market evolutions are bringing change . . . that must be adapted to by manufacturers. Teleprocessing implementation is approaching its peak; distributed processing is taking all sectors of computerdom by storm; new, small business units are considering computer use for the first time; autotransaction systems and devices are bringing computers into contact with consumers for the first time. Most of the developing computer market segments have niches if not actual gaps for aggressive minimakers to fill.

Awareness of these trends is showing up among minicomputer manufacturers, and hardly a week goes by in which there isn't some announcement related to this growing direction in the marketplace. DEC, for example, has been tweaking its product line, adding such features as an enhanced operating system and a data entry language to the software capability of its small business offerings. The result it calls the CTS (Commercial Transaction System) software.

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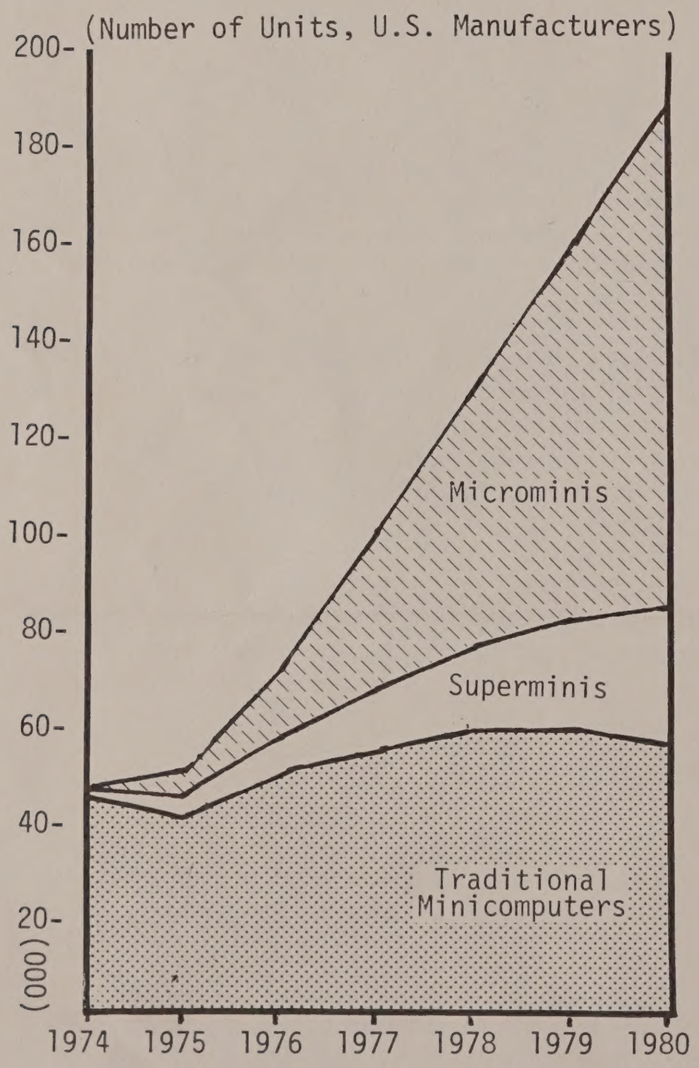
SIZE DISTRIBUTION OF WORLDWIDE SHIPMENTS BY U.S. MINICOMPUTER MANUFACTURERS



A new classification of minicomputer, the micromini, will have volume shipments this year. IDC defines this new product as being based on LSI technology, generally available in some version for less than $1,000, and currently being limited more by processor speed than by memory speed. In general, they compete today with DEC's LSI-11 and PDP-8A computers.

Superminis, another relatively new category, generally sell for above $25,000, have 16-bit words and a memory cycle time of one microsecond or faster, and software that includes assembler, operating system, and a high-level language such as Cobol or Fortran. These products compete with DEC's PDP-11/45 and PDP-11/70.

The number of microminis shipped in 1978 will be quadruple the 13,000 estimated for this year, and will double again by 1980 to account for over half the almost 200,000 minis to be shipped. In value, of course, they will represent only 12%. Superminis, with average values of $80K, will account for 15% the units but slightly over half the value of 1980 shipments of over $4 billion. About 850,000 U.S. minis will be out then.

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Time for the Idea . . .

And Data General -- its heavy OEM business impacted during 1975 — is beefing up its offerings with Idea (for interactive data entry/access), a new software approach tied in to a new version of the commercial Eclipse minicomputer. Called the C/330, this new product has twice the memory, more peripherals than the C/300, and better communications capabilities. The Idea software, says Data General, provides for "fast, easy creation and maintenance of data entry/access and data base inquiry/response programs in multi-terminal, transaction-driven applications."

One of the keys to the system, which can have up to 16 terminals, is a screen format generator. It lets users design multiple screen formats at the system console by entering headers and data positions on the screen and moving them around until they look right. These can be stored and called up by operators as they attack various jobs at the CRTs connected with the system.

Thus, all terminals on the CPU can be dedicated to the same application, or they can each handle a different application. Some, Data General illustrates, can be doing data entry and validation while others do data base inquiry. A monitor built into the software automatically keeps audit trails and logs system activity by operator, terminal, screen format, batch number, and date; furthermore, it keeps an error log. A non-programmer can generate data entry programs in about 30 minutes according to a company executive.

. . . that needs more memory

The new Eclipse computer announced with Idea, the C/330, has a doubled memory capacity, to 512K bytes using 64K byte MOS memory or 32K byte core memory on a single-board module with respective speeds of 500 nsec. and 800 nsec. The C/300 can also run Idea if it has 128K bytes of memory. The new Memory Allocation and Protection (MAP) unit provides hardware protection for user programs when more than one program is running.

Along with the C/330, Data General announced the availability of a new 600 lpm printer (supplied by Data Products). Also, it introduced the RJE80 remote job

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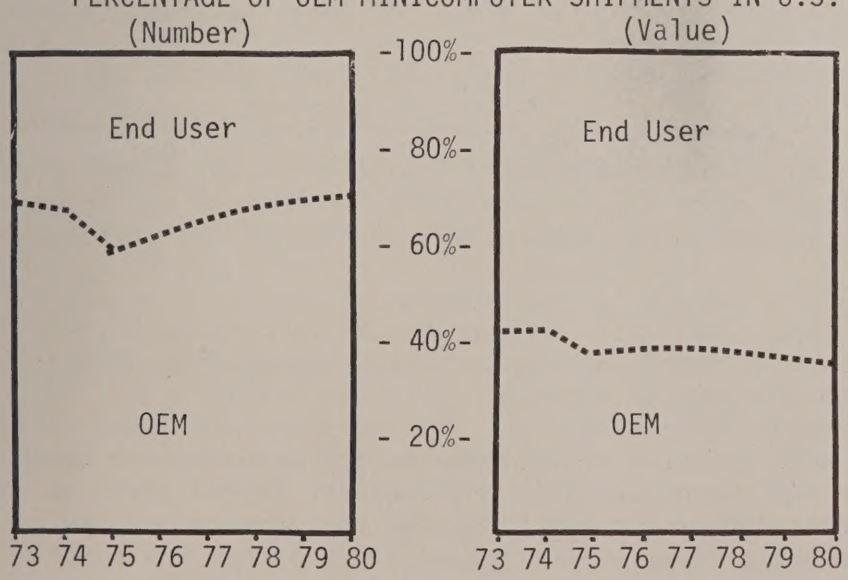
PERCENTAGE OF OEM MINICOMPUTER SHIPMENTS IN U.S. MARKET, NUMBER AND VALUE



The actual number of OEM minis shipped in 1975 fell slightly to the 21,000 mark as U.S. markets reflected the recession. The end-user market didn't suffer so.

Over the next five years, IDC expects the average value of OEM minis to drop slightly, from almost \$15K to the \$12K level, as the number of units zooms. As a result, the OEM market will take 70% of more than 130,000 units but only 35% the \$3 billion shipments.

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entry terminal emulator for both 2780 and 3780 terminals. RJE80 supports four types of remote job entry systems:

1) point-to-point communications between a Nova or Eclipse and an IBM 360/370 host;
2) point-to-point communications between two Data General computers;
3) multi-dropped DG systems communicating with an IBM 360/370 host;
4) multi-dropped DG computers communicating with a Nova or Eclipse host.

This capability is particularly suited to applications that require large volumes of data to be gathered from multiple sites and transmitted to a host for batch operations at a later time, the company says.

. . . and isn't exactly cheap

There's a lot of "big computer" talk going on here, and there's a pricetag associated with it, even though DG probably would argue that it's considerably less than a general-purpose implementation. A small (4-terminal) Idea system includes 192K bytes of core, a 10M byte disk, a tape drive, 300 lpm printer, and the associated communications equipment, CRTs, and software; it sells for $120,500. The full-blown (16-terminal) system with 384K bytes of core, two 92M byte disks, a magnetic tape subsystem, 600 lpm printer, CRTs, multiplexors, and software costs $230,000. Good or bad, the price isn't peanuts.

It's because of prices such as these on today's user-oriented minicomputers that DG's president says he expects average system values to continue to increase over the long run. IDC's latest research indicates that the average value of minicomputer shipments hovered around the $20K level during 1973 and 1974 but now is slowly heading for $24K by the end of the decade. The average shipment value for end-user systems, moreover, is expected to be more than twice that figure by 1980.

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Spot check on used computers

USED COMPUTER DEALERS REPORT A PROFITABLE 1976
370 DEMAND ON THE UPSWING AS USERS CASH IN PURCHASE OPTION CREDITS

> Wanted to buy: System/3 Model 15. Will exercise your purchase option credits and give you "something for nothing." Write or call . . . .
>
> Regardless of IBM's announcement on 370/148, [we] will purchase your 370/145 today. We are also looking for any other 370 equipment . . . .
>
> 168-3 available. New ITC [Investment Tax Credit] qualifying . . . .
>
> Wanted to buy: 65 OEM Memory. For above 1 Meg Level -- Spare parts must be accessible . . . .
>
> Sending Equipment Back to IBM? [We] will use your rental credits to buy your equipment and save you the freight costs, penalties and pay you a finder's fee. The equipment we want to buy . . . .

And so the ads go . . . as the used computer industry hawks its wares in the trade press, in weekly circulars, and even with handbills and sandwich boards (seen at NCC). One week a publication called Computer Hot Line, for instance, placed 48 pages of ads with close to a thousand "want to buy" classifieds before the compu-

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ter-buying public. In the same week, Computerworld, the well-known industry weekly, ran twenty-two columns of ads devoted to buying or selling computers.

That's the medium. The message? Despite its less-than-glossy marketing vehicles, the used computer industry is big business. And for used computer dealers -- the Computer Dealers Association lists 51 members in 21 states and Canada -- 1976 seems to be shaping up as the year of the "buy"-centennial:

- In a recent informal telephone survey of more than a dozen used computer companies -- ranging in size from $80 million Comdisco to $1 million Computer Merchants, Inc. (formerly Time Brokers, Inc.) and representing over half the industry by revenues, profits, or list price of equipment placed -- the dealers reported an excellent year for both revenue growth and profits.

- The dealers also reported that business has been aided by IBM's policy on purchase option credits -- revised in August, 1974, to allow users on rental (MAC) or lease (ETP, FTP) to accrue up to 50% of system value in purchase credits over a period of 36 months. Previously, credits accrued for only 12 months. As large portions of the user population approach that 36-month watershed . . . dealers are able to buy 3-year-old systems at half price, resell them at higher prices, or release them at special rates. This compares with IBM's policy of reselling or re-leasing returned systems at full book value.

- In a recent study on the migration patterns of IBM users, IDC, publisher of EDP/IR, surveyed user acquisition plans for 1976 and found a strong on-going demand for purchased systems -- 360 and 370 both -- pitted against a tight supply. As a result, used computer prices and portfolio values should remain high.

An IBM phenomenon

If the Giant's policy on purchase option credits has nourished the used computer industry, its policy on maintenance has supplied its birthright. Although third-party maintenance firms like Sorbus or Comma can refurbish and maintain used IBM systems . . . it's really IBM's own willingness to supply parts and maintain software and hardware that users and dealers depend on. (In contrast, witness the flap brought about by Honeywell's decision to charge second owners software fees on their used systems. Dealers and users alike squawked.)

Of the fourteen companies polled by EDP/IR, for instance, five dealt only with IBM equipment, four only with IBM and plug-compatible peripherals or add-on memory, and two more with IBM most of the time. Three other companies had one mainframer in addition to IBM in whose equipment they specialized.

Besides the predominance of IBM in equipment portfolios, EDP/IR noticed:

- There's a shifting from 360s to 370s. Of the fourteen companies, only three dealt only with 360s. Of the others, the split was weighted toward the newer family. And the dealers reported that the trend away from 360s will continue.

- Brokering is on the wane. Four companies reported no brokering at all, seven reported only occasional brokering (5%-10% of business), and on-

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ly three reported that 15%-60% of their business consisted of brokering. Some also reported occasional brokered leasing.

- Leasing is more common than brokering, but still not as common as outright buying and selling. Three companies did less than 10% of their business in leasing, six did less than 50%. Two companies specialized in leasing.

- Companies run the gamut in customer mix. Four reported 90% or more business with end users (vs. other dealers), four were in the 70%-85% range, three were in the 50%-66% range, and one at 30%-40%.

A unique market

Unlike marketeers of other types of used equipment, used computer vendors don't have to contend with machinery that wears out. Thanks to electronics, a used computer can function just as well as a new one . . . so deterioration of the equipment is not the driving force behind prices or availability. There are other factors, however, to affect the desirability of a vendor's offerings. For a particular piece of DP gear these can include, but are not limited to: 1) invesment tax credits left on it, 2) maintenance availability, 3) technological obsolescence, 4) supply and demand, and 5) user needs.

(Actually, said the dealers, it's often a selling point that the older systems are more familiar to users and that older equipment and software has had time for major bugs to be worked out.)

The IBM 1401 illustrates the kind of factors affecting the market. For many years it remained a good seller in the used marketplace (at least until the minicomputer invasion) . . . while its "big brother" the 7090 did not. Why? User needs. The 1401 was a multipurpose machine geared to many tastes and adaptable to a changing mix of scientific and business applications.

So too, because of technological advances, CPUs and various types of peripheral gear depreciate at varying rates. Items with a relatively slow pace of technological change -- such as printers -- see a slower drop in residual value than CPUs and other components vulnerable to the learning curve. As a result, prices for complete or partial systems can vary depending on what peripherals and memory configurations they come with . . . and the matching of buyers and sellers can be a tangled, phone-jangling affair. According to EDP/IR's dealer contacts, while the selling of whole systems is nice . . . there's more profit in peripherals.

Residual values

Indeed, there are many factors that affect the "residual value" of a computer model. Traditionally it drops rapidly right off the bat -- 10%-15% the first year -- then more slowly during the active marketing and production phase of 3-4 years. After that it typically drops more rapidly again as "replacement" systems are anticipated, delivered, and shipped in volume. Then -- normally about seven years for a full-life IBM product -- the rate of depreciation slows, although decay continues as supply begins to exceed demand.

IDC's 360/370 migration study for 1976, along with EDP/IR's recent input from vendors, reveals the following about "residual values" -- as a percentage of original list price -- for the two computer families:

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- In 1975, 360/20s sold at 28% of list, 360/30s as 16%, 360/40s at 19%, 360/50s at 23%, and 360/65s at 22%.

- Also in 1975, 370s sold between 65% and 86% of list except for 155s and 165s, which generally sold at slightly less than half.

- 1976 vendor price lists indicate that 1975 residual values have held fairly well during this year. Mainframer summer announcements, however, should sharpen the curve again as midrange 370 users anticipate the new 370s and lower memory prices on the new systems -- and their competition -- devalue used equipment portfolios.

But users won't change their plans radically, and as a group at yearend 1975 they indicated plans to purchase more 370s -- and 360s for that matter -- than they planned to sell. The survey data on the availability of computers for purchase in 1976 is shown in the chart below.

For used computer dealers, the numbers are happy ones. With the demand for computers for purchase exceeding the anticipated supply, prices are likely to remain firm. And while IBM's new systems may cause a "glitch" in the residual value curves for used 370s . . . the company's pricing actions during the last year may stimulate the used equipment business merely by encouraging users to "think purchase." And that bodes well for hucksters of second-hand computers in this, a brisk and profitable year.

U.S. AVAILABILITY OF PURCHASED 360s AND 370s FOR 1976
(Copyright 1976 by IDC; Source: IDC 1976 Migration Study)

Model	Number Owned 12/75	Number Owned 12/76	Difference (Old User Supply)	New User Demand	Total Marketplace Demand
360/20	408	380	28	-	(28)
360/22	40	40	-	-	-
360/25	29	29	-	-	-
360/30	832	790	42	37	(5)
360/40	459	459	-	12	12
360/50	211	211	-	77	77
360/65	200	200	-	9	9
Subtotal	2,179	2,109	70	135	65
370/115	88	110	(22)	35	57
370/125	224	245	(21)	19	40
370/135	537	550	(13)	9	22
370/145	608	610	(2)	39	41
370/155	292	292	-	24	24
370/158	304	375	(71)	57	128
370/165	75	75	-	-	-
370/168	91	110	(19)	16	35
Subtotal	2,219	2,367	(148)	199	347
TOTAL	4,398	4,476	(78)	334	412

Note that there is no forecast glut of 360s; and how many of those 370s will come from IBM, how many from hustling used computer dealers?

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• "TAKE A LETTER," DICTATED DICTAPHONE CHIEF, E. Lawrence Tabat, resulting in a missive to members of Congress that accuses AT&T of an "outrageous effort to deceive the public" and pretty well sums up complaints of Bell competitors to the Consumer Communications Reform Act of 1976. Tabat says, ". . . if the FCC's authority to establish fair national rules governing the connection of equipment to the interstate communications system was taken away and given over to the states . . . instead of a uniform, simple system permitting customers to attach the equipment of their choice to the phone network, some 50 regulatory agencies would come between the consumer and firms such as Dictaphone."

Tabat also attacks Bell methods: "First it tried to prove that competing equipment would degrade the network," and with that claim discredited, "now it claims that competition would deprive it of revenues it needs to keep residential phone rates down." But Tabat points out that the New York State Public Service Commission, at least, suspects residential rates may, in fact, be subsidizing specialized offerings (see EDP/IR, May 28,1976). Tabat's is a familiar tune . . . one that will be piped before Congress later this month when the House Subcommittee on Communications, led by Rep. Lionel Van Deerlin (D-CA) conducts hearings on the bill.

• "WELCOME TO THE FOLD," SAID PERTEC TO iCOM, INC., thereby continuing a major year of wheeling and dealing in corporate acquisitions. Earlier this year, Pertec acquired Computer Machinery Corporation, renamed CMC Group, which will use CRTs and other Pertec Business Systems Division products in its own end-user equipment. Pertec then siphoned off Cipher Data Products from CMC and sold it to a group led by Cipher's president. With microperipheral maker iCom now in its stable, Pertec has changed its name to Pertec Computer Corporation and is one of the largest peripheral equipment manufacturers in the country.

• "NYET" SAID UNCLE SAM to IBM's first proposed reservations system for the Soviet Union's Intourist Agency, but "Da" -- or yes -- to the Giant's second, and smaller offering. The rejected system would have provided the travel agency with a 370/158, 370/145, and 32 disks, but U.S. authorities feared it would assist in police surveillance of travelers. The smaller system, worth $5 million, includes a 370/145, 8 3330 disk drives and 140 terminals (4505) for reservations clerks.

• "NOT SO FASTENED," CRIED MEMOREX CORPORATION, asking a Federal Court for a preliminary injunction requiring IBM to price disk drives and disk packs separately in its 3344 and 3350 systems. In both machines the disk pack is bolted to the disk drive and not offered separately. But, contends Memorex, though a user cannot remove or replace the disk packs, field service personnel can. Since disk drives and packs have long been viewed as distinct products, Memorex holds that IBM is trying to reestablish its monopoly in disk packs with these new products. The company is asking for a speedy ruling on this part of its antitrust suit initiated against IBM in 1973 and set for trial next March.

• "ME TOO," ANNOUNCED NCR, increasing the memory on its Century 151 to up to 276K. Formerly available with a maximum 128K memory, the basic system 151 with a 192K memory sells for $150,000 and rents for $3,675 on a 5-year contract. The 256K memory machine sells for $160,000 and rents for $3,975. Available immediately, the expanded memories can be housed in existing cabinets.

• "H. R. WHO?" Tymshare's growing network of tax processing services has just been increased by the acquisition of Unitax, a California firm.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" SEPTEMBER 24, 1976 • VOL.12,NO.4 P.J.McGOVERN,PUBLISHER

Goading a glacier

JUSTICE DEPARTMENT'S CASE LUMBERS HOMEWARD AS COURT STREAMLINES PROCEDURES FOR ENTERING EVIDENCE

Edelstein made it clear he feels "like a hostage -- a willing hostage, but a hostage nevertheless" where this case is concerned. During the week he said he would sit on the bench for the rest of his life if necessary, and also made reference to the fact that he could have retired last year. He warned the parties that the team members will be old by the time the case concludes. He told them he knew what the lengthy proceedings must be doing to their home and social lives.

-- IDC courtroom observer
weekly analysis, 7/9/76

When last we searched for a sign -- any sign -- of life in that sluggish thing calling itself an antitrust trial and lodged -- eternally, one suspects -- in a district courtroom in New York's Foley Square . . . the massive IBM-US suit had just slogged its way out of the "market definition" phase of the government's show into the "conduct" phase. Since then the trial has observed its one-year anniversary, transcripts of the case have burgeoned past the 25,000-page mark, and the number of documents introduced into evidence have entered the four-digit realm.

Also since then, the government's lead attorney, Raymond M. Carlson, pronounced the DOJ's presentation over seven tenths complete. But IBM objected, saying it was more like three tenths complete . . . and outside observers wondered how it's possible to clock such a slow moving beast anyway.

Concerning the issues, the government's "bundling" phase of the case is complete, the "fighting machines" portion well on its way. In both areas, the strongest points have been scored by IBM's internal documents -- not witness testimony or deposition. But while these important substantive issues of the case were grinding slowly through the legislative mill, the administrative and procedural aspects of the case stole the show:

- IBM objected violently to the DOJ's use of FBI agents to interview its witnesses . . . objecting not so much to their use in an investigatory role, but to their use at this stage of the case -- when witnesses are already named. Subsequently, the judge rejected IBM's arguments, but laid down ground rules for FBI questioning of witnesses.

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- IBM fought and lost a battle to retain possession of some 20,000+ documents it considered "privileged." Edelstein ruled against the Giant, and the Second Circuit Court of Appeals rejected IBM's request for a writ of mandamus against that ruling. *After all that, however, IBM's counsel reported that as much as 40% of the documents were no longer confidential anyway.*

- The mutual charges of lawyer misconduct -- first hurled over a year ago -- surfaced several times. Evidentiary hearings were scheduled and cancelled; now the two sides say they are willing to stipulate the matter, which would end the flap. The judge has yet to decide whether or not he'll allow such a stipulation.

- Fazed by the prospect of enduring weeks of deposition-reading, Judge Edelstein began absenting himself from the courtroom (EDP/IR, July 22, 1976). His actions did speed matters up, but problems arose when the parties had disputes which could only be settled by judicial ruling.

- More recently, the judge and the litigants evolved a method of entering documents into the record by describing instead of actually reading them. This may be the single most effective measure taken to date in efforts to speed up the trial.

Clearly the most dramatic events in this case have been the procedural ones -- whether it's IBM hauling Edelstein before his superiors on the appellate bench, the DOJ defending its use of the FBI, or a disappearing judge -- but in the end they are not the most important ones. For, despite waffling witnesses, an irascible judge, and the somnambulant nature of the proceedings themselves . . . the real issue is whether IBM monopolized or acted with intent to monopolize the computer industry it so clearly dominates.

And the answer to that lies more within the papers piling up before Judge Edelstein than in the legal shenanigans involved in getting them before him.

Bundling down

The government gets mixed reviews for the bundling part of its case. Its witnesses -- five in all -- tended to be vague in their condemnation of IBM's pricing strategy. Though most agreed that the unbundling of operating systems would have been a boon to the independent software industry -- and resulted in better, more efficient software systems for users -- none could make a compelling case that the users were ready for it, or that IBM bundled its prices for predatory reasons.

One witness, in fact, floundered so badly -- with testimony on the stand that contradicted his earlier deposition -- that the subject of perjury actually came up. Another spent six months in legal maneuvers shielding his company's files from the eyes of IBM attorneys, only to find that most of the documents finally "discovered" were not used in the case.

But IBM documents told a more decisive story . . . portraying a corporation long concerned at the highest levels about its pricing strategies. Within IBM it was a foregone conclusion that unbundling would eventually come about . . . but when was a subject of great controversy. Perhaps most damaging were memos concerning the unbundling of maintenance . . . which IBM's own financial analysts considered to be priced significantly lower than cost. But, unfortunately for a

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Department of Justice anxious to make its point, these documents failed to link the Management Review Committee's decisions to remain bundled with a specific intent to stifle competition. There were always other good reasons not to price the service separately.

35 men in a garage

In the "fighting machines" segment of the DOJ case, IBM documents (there is only one witness scheduled to be called to the stand) depict a corporate giant flailing under the advance of CDC in the large-scale, scientific computing market. IBM's response to the CDC 6600 -- developed in just 18 months by only 35 people, much to the amazement and consternation of T.J. Watson, Jr. -- concealed in the form of the IBM 604, later dubbed the IBM Model 90.

Developed under the constraints of selling to sophisticated "gold chip" scientific accounts like the Argonne and Lawrence Research labs -- which IBM felt would add prestige, if not profitability, to its customer base -- the Model 90 was tested and marketed outside the normal IBM product pipeline. Plagued with software hangups and late deliveries, it was overpriced and underpowered compared to IBM's initial expectations . . . and a financial bust. If the documents entered into evidence by the DOJ do not show the Model 90 was in fact a "fighting machine" -- introduced solely to shortcut the competition -- they do describe a half-baked and ill-timed development program.

(One IBM executive likened the techniques used in developing the Model 90 to "shooting an arrow into a wall and painting a bullseye around it.")

Similarly, the 360/67 and 360/44, developed hurriedly in response to GE and CDC inroads in the scientific computer market, were losers. Once again late deliveries and software snafus were culprits. Complained one IBM executive in a memo unearthed by the DOJ: "I believe that DP is requesting from the Products Division such complex systems that they get all bogged down. Selling becomes easier for DP when they can promise the moon, but probably we should offer more often than not 'poor man's' time sharing systems as our competitors do and slug it out with them in the marketplace."

Yet to be covered by the government in its "fighting machines" segment is the announcement of the 360 series. Justice Department lawyers claim that the excessive lead time from product announcement to first installation was a deliberate ploy to forestall competition . . . IBM counters that users needed the extra time to acclimate themselves to the radical concepts of the series.

20,000 documents, under the sea of

Documents, documents, and more documents . . . the government's case will fly or flop on the strength of them. One group is of special interest: The documents IBM says were inadvertently passed through "screening for priviledge and tendered to CDC, from which the DOJ obtained them. (At one point, IBM risked a a contempt citation and a $500,000/day fine for not turning them over.)

These documents are now finding their way into evidence. One was the well-publicized "Faw Memorandum" (EDP/IR,April 19,1976; Dec.29,1972). Another that may offer similar insight is a July 8, 1969, memo from P.J. Rizzo to N.L. McElhatten and J.P. Maurer. Portions of it are reprinted on page 4; the complete text -- and other trial documents -- can be obtained from IDC or the Computer Industry Assn.

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EXCERPTS FROM THE P.J. RIZZO MEMORANDUM, JULY 8, 1969

[In the light of past affects the environment external to IBM has had on it] . . . consider the implications on the future of anticipated changes on the structure of the computer industry. I am particularly concerned with the "financial" structure of IBM in the context of a rapidly changing industry which we will promote in order to avoid massive legal problems. You may wish to add to the environment, and the following are only these considerations which I have had in mind:

1. Hardware, per se, will become of lesser and lesser significance over the next ten years in its profit leverage.

2. Support services, particularly maintenance, will assume major financial consideration for IBM.

3. Systems Management contracts for maintenance of hardware and software will be key to control of market place.

4. IBM software, service, and hardware will become freely interchangeable with competitors, OEM's, software houses, etc.

5. A significant used equipment market will emerge.

6. "Purchase" will represent bulk of equipment transactions with lease relegated to pure financial type leasing. (This raises the technical questions of technology management and equipment design).

7. Technology will be key to hardware business; while marketing and service will be key to all other elements of business, etc.

The foregoing raise questions on:

1. Trade-in allowance.
2. IBM in used equipment market.
3. Capability of FE.
4. Potential new competitors (TI, Motorola?)
5. IBM Accounting and Financial Policies.
6. SBC role.
7. Profit Center Organization.
   Etc.

. . . we should debate the approach IBM should take to studying these issues. I am concerned with our role because accounting and financial policies will need to change to meet any new environment and, correspondingly, we must attempt to push the new environment at a rate and in a direction which optimizes the financial posture. Conceivably, we should be changing now to help motivate the business toward a given objective.

There'll be more to come, too. "Educational allowances" -- also predicated on IBM documents -- follows "fighting machines" and as few as two witnesses may be called. Then comes IBM's conduct in peripherals (Telex) and with respect to third-party leasing. Finally, the DOJ will tie up the loose ends associated with the exits of Xerox and Singer from the computer industry.

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Is the government's case three-quarter's done? EDP/IR, like IBM's lead counsel Thomas D. Barr, has its doubts. Despite the new procedures, the government is still only a third of the way through its current witness list. Once the testimony is "live" again, IBM will have the opportunity to stretch the proceedings with its cross examination . . . and the judge will no longer be able to wall himself up in chambers and get ahead in his reading.

"If this case takes X, Y, and Z years now," he says, "it will take A, B, and C years more to do it right." And how many years is that? With all the exhibits, transcripts, documents, and depositions yet to come, one wonders how Judge Edelstein, a mortal after all, will ever wade through the verbiage.

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ON DECK: CALCOMP, MEMOREX, ET AL IN PRIVATE SUITS AGAINST IBM

While the industry leader faces Uncle Sam in a frontal assault in the courtroom in Foley Square, at its flanks nip a slew of private companies. But again, even when private dollars are involved, the legal wheels turn slowly. Since EDP/IR last took the pulse of the private suits against IBM (EDP/IR,April 21,1976), not much has changed.

The rundown:

- CalComp, scheduled to tee off against IBM on this coming November 8, has dropped the "tapes" portion of its case. The company will restrict its presentation to IBM's conduct in the disk drive industry.

- Memorex (and Forro), representing the single biggest monetary threat to IBM -- $3.5 billion in damages asked between them -- saw a March, 1977, starting date slip to April at least.

- Transamerica and Hudson General, which had starting dates of August of this year vacated long ago, are still in the pretrial discovery phase. It's likely they won't go to trial until CalComp and Memorex are concluded at the district level.

- The others -- Sanders, DPF, and Levin -- are still in the pretrial discovery phase with no trial dates set.

Two other important lawsuits are still pending. Catamore and IBM went before an appellate court and argued orally a lower court decision awarding the tiny jewelry manufacturer $11.4 million against IBM. Catamore complained that it did not receive the goods and services it was promised and that fraud was involved; IBM claims that the matter is a contract dispute and therefore oral arguments between it and Catamore should not have been entered into evidence.

Finally, an appellate decision on Greyhound's appeal on the dismissal of its antitrust suit against IBM four years ago is now over two years in the making.

Though pretrial activity in all these cases is proceeding apace, readers are reminded that it was just about a year ago that Marshall Industries settled out of court with IBM for $800,000 . . . and shortly after that Telex dropped its Supreme Court appeal for the price of its countersuit.

It could happen again.

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Computer bad guys

THE LATEST IN WHITE COLLAR CRIME . . . COMPUTER ABUSE
CRIMINALS MOSTLY BRIGHT; MANUAL HANDLING OF I/O DATA MOST SUSCEPTIBLE

These days an up-to-date con man doesn't peddle the Brooklyn Bridge or a diamond ring reduced in price "just for you" . . . but deals instead with a less tangible product: Computer files. Want to learn what your competitor is doing? Like to record your bank deposits but not your withdrawals? Need a shaky credit rating changed? Then you might be just the right client for this new criminal . . . and computerized America just the right victim.

This month's indictment of six people for allegedly manipulating credit rating records at TRW -- which tends the nation's largest computerized credit data bank -- is a dramatic example of the new style of crime made possible by our growing dependence on the computer. Ironically, the crime alleged involved no sophisticated tampering with electronics or software . . . but a simple manual alteration of the files. The six are charged with paying a TRW clerk in the Consumer Relations Department $50 a record to make the changes; clients of the ring are alleged to have paid up to $1500 for the service. The indictment lists 16 cases of fraud, but TRW has already warned credit granters that the records of over 100 people may have been altered.

The growing frequency of this kind of entry in the criminal annals make especially pertinent the recent research on computer abuse -- presented in the proceedings of this year's NCC -- by Donn B. Parker of the Stanford Research Institute (SRI). Parker engaged in a two-part, five-year study of computer abuse, first analyzing 375 reported cases of computer-related crime and then interviewing in depth (over 20 hours in some cases) some 17 of the perpetrators.

Based on the 17 interviews, Parker draws the following profile -- disturbing in the way it doesn't fit the expected "criminal" mold -- of the typical offender:

- He or she is young, ranging from 18-46, with a mean age of 29. The job skill level of offenders is high -- 12 of the 17 were managers or experienced professionals.

- In the syndrome of white collar crime, the offenders deviated from the accepted practices of their associates only in small ways; and perpetrators feared exposure of their acts to families and peers even more than incarceration.

- Most of those studied thought of their acts as "games pitting their skills against the computer and the victim organization." Generally the offenders distinguished between harming individuals -- which they considered highly immoral -- with harming organizations (beating the system), which they did not.

- Peers and superiors had viewed these people as "reliable, honest, bright, highly motivated in their work and most desirable people for a manager to hire."

To detail the data processing functions most vulnerable to computer abuse, Parker examined the 375 cases assembled in the first part of the study. From them he derived these statistics:

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- Poor controls over the manual handling of I/O data accounted for 41% of the cases. A case in point is one where a data control clerk in a bank embezzled money by diverting checks into his own account.

- Weak or non-existent controls over physical access to computing facilities accounted for 13% of the cases. Financial gain occurred most often through the unauthorized sale of computer services; but extortion, vandalism and espionage also occurred.

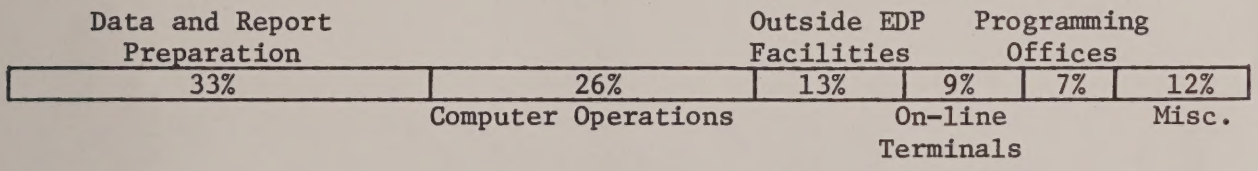
- Overly informal computer and terminal operations procedures aided 12% of the cases, e.g., a computer printer operator who made carbon copies of competitive bidding reports for industrial espionage.

- Poor business ethics led to 11% of the cases. Here the principal act was more related to a company's practices or management decisions than unauthorized acts of individuals using a computer. The results were deception, management fraud, espionage, sabotage in competitive situations, and so on.

- Miscellaneous problems occurred in operating system access and integrity, timesharing services, and magnetic tape storage.

As expected from the nature of the abuses perpetrated, the "scenes of the crimes" in the 375 cases examined were distributed pretty much according to the functional areas affected. The bar graph below gives the breakdown:

FUNCTIONAL LOCATIONS OF COMPUTER ABUSE



Preventive measures

To cope with the increasing numbers of computer abuse cases, Parker envisions a parallel growth in security . . . with "need-to-be-here" replacing "need-to-know" as a criterion for security access and safeguards dictated by the specific vulnerabilities of a data processing system.

But EDP/IR expects the problem will continue to grow . . . at least until computer professionals, educators, and users inform themselves of the dangers, as well as the benefits, of the computer age . . . and until potential offenders realize that "beating the system" is not a victimless crime.

THE CASE OF THE DISGRUNTLED EMPLOYEE

At first it makes you chuckle . . . the thought of a maintenance engineer venting his frustrations with a computer on its memory stacks with the help of a screwdriver (case #72112). After all, haven't we all been undone at one time or another by one of our electronic monsters? But that outburst cost some company $590,000. Then you look through more of Parker's agenda of crime -- another frustrated employee took a gun to his nemesis -- and you realize the potential for damage couched in just a single disgruntled employee. Food for thought.

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• WANG LABS HAS GRAFTED SOME NEW PRODUCTS INTO ITS LINE, namely a new CPU for the 2200 family and a new, low-cost 110 cps character printer. The new central processing unit, the 2200VP, provides up to 64KB of memory (16KB blocks) and comes with a new 500ns Random Access Memory (RAM) which also contains the instruction set for an "enriched" version of Wang's BASIC programming language. (Earlier 2200 CPUs featured BASIC hardwired into Read-Only Memory.) Wang says the 2200VP is compatible with its current 2200 line except tape cassette drives and a hand-fed Mark Sense Card Reader. A 2200VP CPU with 16KB of memory and nine I/O slots is priced at $13,000, with additional blocks of memory at $3,200.

Wang's new printer -- a 40-column, desk-top matrix device called the Wang 2251 -- is offered as an alternative to conventional thermal printers "which use expensive, heat-sensitized paper and have high energy requirements." It weighs eight pounds, prints on a 220 foot paper roll at 110 cps on a 3 and 3/4 inch strip. The price for the new Model 2251 is $1,100.

• JUMPING INTO THE ALPHABET SOUP OF WORD PROCESSING, Philips has announced the WP 5000 . . . "a sophisticated universal word processor family with video display, automatic printing, and unmatched text revision and text editing facilities. Keynote of the new system's design is operational simplicity." Says the Dutch company, the WP 5000 is "user friendly," meaning it provides instant operator feedback, but doesn't go so far as to offer operator prompting. Three versions will be available, the first with magnetic card storage, the second with floppy disk storage, the third with two floppy disks. The standard "daisy wheel" type printer will come with the system. Philips will first market the WP 5000 in the U.S. under the name Norelco WPS . . . later will offer it in Europe. A typical system will cost $17,000.

• AERONUTRONIC FORD COPPED THE BIGGEST INTELSAT ORDER EVER, in fact, says the company, it's "the largest single award ever made for a commercial satellite communications system." Under the $235-million contract, Aeronutronic Ford is the main contractor charged with the responsibility of providing seven INTELSAT V large-scale satellites for the 95-nation Intelsat organization. Says the company, the new satellites will be "next generation" devices with highly increased communications capabilities. The first INTELSAT V is scheduled for launch in 1979 -- on a spacecraft designed for compatibility with the U.S. Space Shuttle.

• IN PLAIN ENGLISH, SPERRY HAS BEEFED UP ITS QLP 1100, the Query Language Processor associated with its DMS-1100 data bases. The new release (Level 2) provides report writing facilities for QLP 1100 users, enabling them to specify the appropriate format for "practically all types of data base reporting requirements." QLP 1100, says Sperry, is "command-language oriented" using a simple English format.

• SOME NEWLY ANNOUNCED PRINTERS include a 160 cps bidirectional matrix printer from Tally, called the Model T-1602. Microprocessor controlled, the new unit can crank out up to 200 lpm, says the company. The latest in Tally's T-1000 family, the system will offer interface controllers for minis, datacomm usage, and emulation of other printers. OEM prices start at $3,115.

Decision Data has introduced the 6609 System/3 Printer, a 900 lpm unit with monthly rentals as low as $670. Designed for use on most models of System/3, the 6609, says the company, can enable users now renting IBM 5203 300 lpm printers to triple their printing capabilities and lower monthly payments by $13.

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"THE GRAY SHEET" SEPTEMBER 30, 1976 • VOL.12,NO.5 P.J.McGOVERN,PUBLISHER

FM: Alive for specific industries -- page 3

SPERRY UNIVAC AND THE SMALL BUSINESS SYSTEM MARKET: IS A SYSTEM/32 COMPETITOR IN THE WINGS?

Like an all-night big-city "disco" joint, the small business computer market is continually hopping. And whether it's new System/32 stuff from IBM, Basic/Four getting into iron-making (page 8), Microdata's success with "Reality," or just the "routine" activity in an industry currently growing in units installed by 35% a year . . . one thing seems certain. Everybody's out on the dance floor.

Except Sperry Univac.

But ever since news surfaced about Sperry Univac's and Decision Data's joint venture -- code-named Project Acorn -- pundits have speculated on the eventual entrance of the number two mainframer into the small business systems market. After all, IBM, Burroughs, NCR, and Honeywell are all in it. Why not Sperry? And Decision Data's half-announced System/4 -- not to mention Sperry's own success with its small 90/30 -- have added logic to those theories.

Well, last week EDP/IR got wind of a new Sperry system in site tests now, internally called the BC/7, which may put an end to those pundit ponderings. Set for release between now and the end of Sperry's fiscal year in March -- the actual date depends on the marketing environment (IBM and its S/32), the fine tuning of software and firmware, and Sperry's corporate jitters at jumping into a brand new market -- it will compete toe-to-toe with the System/32 with a price supposedly between $25,000 and $150,000. According to EDP/IR's source, the BC/7 will feature:

- A pedestal desk console with the electronics and CPU in the pedestal, a 5" CRT, and cabinet space for up to six diskettes.
- A microprocessor-controlled workstation with a 12" buffered CRT, and optional thermal printer for hard copy.
- Printing capacity at either 60 or 165 cps via bidirectional matrix printers . . . or with two (125 and 250 lpm) line printers.
- Mass storage with .5 million character diskettes, or 5 and 10 million character cartridge disks.

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But the most important feature of the new system is expected to be its software . . . including a "management information language" that uses operator prompting in conversational language to help the user identify the exact information required from the data base. Called "ESCORT," this language would obviate the need to write and debug programs whenever new information is required. In addition, Sperry will offer packaged industry-unique applications programs like IBM's IAPs for the System/32 . . . but with built-in user-tailorability through a technique dubbed "GENIE." If the software pans out, it should go a long way in addressing user qualms in utilizing canned applications programs.

EDP/IR contacted Sperry about the BC/7, and naturally the computer maker was closemouthed about its system. But, as EDP/IR interprets the mainframer's hems and haws, if there were such a system in the wings, and if top management gave it the green light . . . observers might notice a striking resemblance between the UTS-700 intelligent terminal (another Acorn offshoot) and the new standalone unit.

If Sperry does market a new small business system -- to a large but admittedly new clatch of users -- it will do so because the market has such immense potential and the company thinks it has an especially unique product . . . and the support and marketing clout to make it viable. But if the BC/7 is out on the market, say five years or so, Sperry expects it will still only account for less than 15% of the company's computer revenues.

\+ + + +

CDC ADDS STAR-100 TO CYBERNET, LOOKS TO WHAT PRODUCTS LIE AHEAD

The purported reason some of the more senior (more gullible? shades of the 1960s!) members of the computer press corps trouped out to Minneapolis earlier this month was to "witness" the CDC Star-100 set a new world speed record for the Guiness people. It did, spewing through some 97.9 million results a second without interrupting any of the other users of Cybernet, to which the Star was recently connected. And no sooner had it set the record than it was spitting out "Recognition Certificates" (via a CDC 6400) for Chief Executive William Norris to sign.

All fun aside, the press event (non-event?) was an excuse for CDC to trot out some of its guns and talk in general about large-scale computing. "Control Data is in the large systems business," attendees were told. The machine being phased into the CDC network is the fourth Star-100 built -- the others are in government installations -- and the last of its type. A Star-100A (LSI vs. core, six times the scalar througput) is to be completed by late 1977; a Star-100C (four times the vector performance, as well) is due for operation in late 1979. Whether these will be more than one-of-a-kind enhancements to the Cybernet is not known.

Technical talk at the sessions, however, evolved around vector processing as opposed to the serial variety standard in most other machines. It involves a new style of problem-solving (e.g., calculating thousands of similar operations such as a type of payroll deduction, with one instruction on properly organized data). But it is important, says Neil R. Lincoln, one of the superthinkers behind CDC's current efforts with supercomputers. "We are running out of circuit speeds, so we will need parallel processing in the future."

Lincoln, in fact, is somewhat "ho-hum" about the improvements planned for the Star. He is working on the machine that will go after the next world's record in the 1980s. He calls it the "Super-X-By-God" in conversation. When asked about this, he says that it certainly is super, "X" is normal for unannounced products. "And every characteristic of the machine brings a 'by God!' reaction," he adds.

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MODEST GROWTH FORECAST FOR FACILITIES MANAGEMENT
INDUSTRY-SPECIFIC CONTRACTS TO SHOW BIGGEST GAIN

> The essential flaw in the classic FM concept is that data processing is an integral part of a user's operation -- unlike such tacked-on problems as feeding the employees or cleaning the halls. Though FM has proven to be an appropriate way to handle relatively standardized types of work in some fields -- such as banking, insurance, and government accounting -- experience has also shown that expertise in computing is no substitute for an intimate knowledge of a company's operations when it comes to running the data processing department.
>
> To put it another way, a programmer for an automated cookie factory has to know as much about cookies as he does about computers . . . .
>
> -- EDP/IR, December 20, 1973

And that's still the way the cookie crumbles. In a recent report on "Facilities Management," International Data Corporation, publisher of EDP/IR, found that the only major segment of the FM market destined to grow faster than the computer industry as a whole is that which specializes in industry-specific contracts. Within that segment, the areas of most significant potential growth are the state and local government market and the educational market.

But first, what exactly is "Facilities Management" . . . other than a once-fashionable term used in conjunction with anything that had to do with either facilities or management? For the purposes of its study IDC considered FM to be the running of another (unrelated) organization's DP department. As such:

+ FM involves contractual arrangement with an actual organizational entity -- be it corporate, divisional, or whatever. The contract usually specifies a definite dollar amount and a definite time span.

+ The FM vendor generally provides all DP applications for a customer on a computer dedicated primarily to that one client . . . at the client's location. Usually, the FM vendor assumes responsibility for an existing data processing operation (often one in bad disrepair).

Not considered FM by IDC are contracts merely calling for the start-up of a client's system . . . or contracts where the vendor assumes all DP responsibility for a client but performs the operation through a central computer shared by many users. (IDC defines this shared computer approach as a part of the computer services market -- a competitive alternative to facilities management.)

The FM market

Thus defined, FM revenues, says IDC, totaled $415 million in 1975 . . . about 13% as large as its primary alternative, computer services. About 1.6% of total EDP industry spending went for FM. Although IDC expects FM growth to continue -- at a modest 15% a year to $820 million by 1980 -- the industry has shed some of the marketing glamor it sported earlier in the decade:

- Profits have proved difficult to achieve, with increasing numbers of FM suppliers -- including the one-time leader, Electronic Data Systems -- moving to the shared computer -- or data center -- approach in efforts to maximize the revenue from each investment dollar.

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FACILITIES MANAGEMENT MARKET GROWTH, 1975 -- 1980
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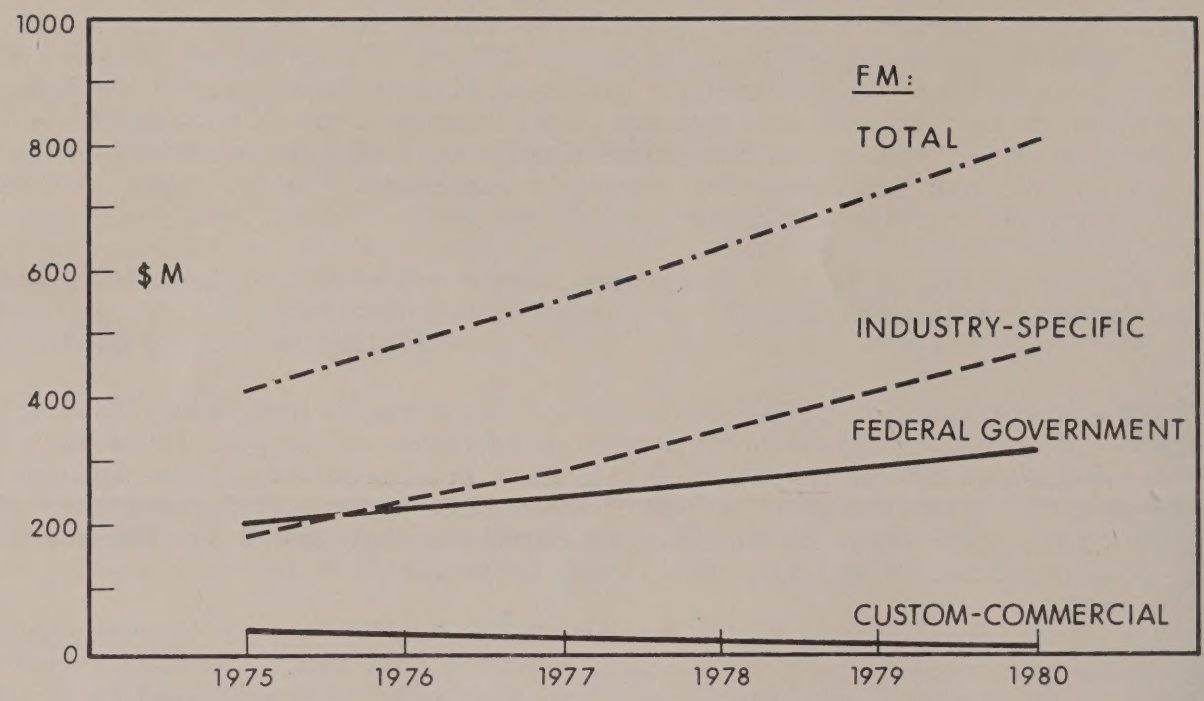

- Contract renewal rates are poor, forcing vendors to scramble for new customers just to maintain revenue levels. Many of the current users of FM interviewed by IDC had no plans to renew existing contracts.

- The emergence of distributed processing -- with on-site minis for immediate processing requirements -- is beginning to look good to the suppliers of computer services . . . causing them to examine the merits of providing true FM services.

The FM market itself is highly fragmented, characterized by many suppliers who have one or a very limited number of contracts. While some vendors have been successful at marketing FM, the vast majority of contracts are difficult to obtain . . . and once obtained, not always desirable because of low profit levels. Only three suppliers -- Computer Sciences Corporation, System Development Corporation, and Planning Research Corporation -- are particularly large. Yet none of these has a market share greater than 12%. Other suppliers are either highly specialized, such as National Sharedata and Systematics in banking . . . or very small participants (less than $3 million in 1975 FM revenues).

(A number of suppliers who purport to offer facilities management are in fact vendors of what IDC calls autotransaction services [EDP/IR,April 30,1975] rather than managers of computer facilities for specific customers under contract.)

Another fundamental characteristic of the FM market is the long-term nature of the contracts involved -- often five years or more. As a result, the complexion of the marketplace changes only slowly, except when a supplier switches from FM to the shared data center (e.g., EDS with Blue Cross/Blue Shield).

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Within the facilities management marketplace, IDC distinguishes three separate submarkets: 1) federal government FM, 2) custom-commercial FM, and 3) industry-specific FM. These submarkets are examined in the sections below.

Uncle Sam as a customer

Federal government contracts -- the so-called O&M contracts -- comprise a unique market segment characterized by competitive bidding, built-in profit margins that make government business more lucrative than commercial business, and, at times, unusual complexity in requirements (research, for instance) over and above strict data processing. In 1975, Uncle Sam was the biggest buyer of FM services -- with $200 million and just under half the total market. The segment is expected to grow, but by 1980 it will have dropped to 40% of the market, with revenues pegged at $325 million.

Three major characteristics delineate the federal government FM market:

- A great deal of rapid revenue growth in past years came from contracts for management of new federal computer installations.
- The government is expected to add fewer new facilities . . . damping future growth. Most of that will come from expansion of existing sites, contracts with existing facilities, and a small number of new sites.
- The complexity of some federal government FM contracts may make this segment of the market undesirable to many FM vendors.

Because of an expected slowdown in the emergence of new full-blown government computer installations -- Uncle Sam has a large computer base onto which new applications can be added -- and the entrenchement of civil service personnel at existing computer sites, FM business is expected to show slower growth than in the past. While new contracts may open up in the fields of energy, agriculture, and the environment . . . they are not considered likely to balance the waning military and aerospace programs that were formerly such a source of FM money.

Custom-commercial on the wane

These are the FM contracts that are unique to each individual client -- where the only real expertise an FM vendor can bring to the client is the ability to manage an efficient data processing center and attract good people. It's a small portion of the business -- $30 million in revenues in 1975 — and one which is losing favor steadily with both vendors and users. By 1980, predicts IDC, custom-commercial FM revenues will only be $15 million.

Behind the demise of custom-commercial FM, lie several factors:

- Profits are low, despite high revenues. FM operations are often in the red until just before they expire -- when the mess is straightened out.
- Renewal rates are poor. Once an FM vendor has improved a client's DP operation, the customer often opts to run his own shop again.
- As the user community becomes more sophisticated in general, FM customers become aware of the greater cost effectiveness of alternative computer service offerings.

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Vendors left in custom-commercial FM are generally of three types. The first is just waiting for current contracts to run out before getting out of the business; the second, like Greyhound Computer, uses FM contracts to open new data centers (managing a facility for one client, moving off-site, then sharing the installation among many clients); the third -- an important factor in keeping this type of FM from disappearing entirely -- is the very small company, generally a services firm, which has taken over the operation for some DP-harried company.

Industry-specific . . . the way to go

Industry-specific vendors sell to several clients within one industry, based on particular applications expertise. Often a particular FM contract will be as customized as a custom-commercial contract -- but the vendor can take advantage of "learning curve" experiences on other contracts. This carryover includes not only software know-how . . . but a sufficient working knowledge of the specific industry for the vendor to bridge that eternal management-DP schism.

In 1975, this segment of the FM marketplace brought in revenues of $185 million for 45% of the total FM take. But by 1980 that figure should more than double to $480 million -- or 58% of total FM revenues. This is clearly the fastest-growing FM market sector, but even here the profits are modest. IDC's extensive interviews with vendors of industry-specific FM point to the facts that:

- Clients are from industries with two qualifying traits -- a low wage scale and conservative financial management. These include such industries as banking, local government, health care, and higher education.

- FM companies can derive significant profits from the sale of computer services from the FM site to other organizations in the same industry.

- Vendors, to be successful, must have a thorough industry knowledge, not just DP expertise. And an industry-wide reputation helps.

- Competition from alternatives -- whether from mainframers, software companies, non-FM service bureaus, or the existing site's DP personnel -- is greater than competition between FM vendors.

FM clients interviewed by IDC generally listed one or both of two main reasons for resorting to facilities management . . . general DP inefficiency or the need to upgrade in a hurry. Often a client industry's conservative financial posture leads to a multiyear standstill in computer upgrading -- data processing is close to the level of initial automation. Complicating matters, low pay scales preclude hiring data processing personnel at the needed professional level (sour grapes in other departments). For management, the hiding of DP personnel costs in an FM contract can be an attractive solution to wage restructuring.

Within industry-specific FM, banks currently account for the highest portion of revenues (36%), local government accounts for the next highest (28%), higher education runs third (7%). But IDC predicts:

+ Banks will expand at a decreasing growth rate and by 1980 be second to local government.

+ The most significant growth rate is projected for higher education -- with potential of developing into a $100 million FM market by 1980.

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Other target industries constitute a decent hunk of the revenue pie, but individually they're small. Some, like health care, already have heavy commitments to computer services; others, like the retail industry don't meet the qualifications (salaries are commensurate at the DP level). Finally, a target industry -- like insurance -- may have been penetrated by its own bigger members.

An elusive concept to market

FM vendors agree: Their biggest competition comes not from each other, but from alternative methods of data processing. Mainframers offer support with the hardware they sell, software houses offer programming answers (and sometimes slip into FM on the basis of applications expertise), shared data centers and service bureaus provide solutions for companies willing to do their DP off-site.

Thus, while an FM vendor may woo a prospective client with the promise of savings in efficiency, industry expertise, budget control, and the application of high-caliber personnel to DP problems . . . competitors may counter with questions of data security, DP isolation from company life, contracting hassles, morale, and the consequences of the FM company's going broke. For this reason, successful FM vendors are often preceded by an industrywide reputation, or previous working relationship with a client.

But there will always be troubled DP shops, there will always be companies to whom offering FM services represents an opportunity. There will always be the "catering" of data processing . . . call it "facilities management."

FACILITIES MANAGEMENT MARKET STRUCTURE AND TARGET INDUSTRY GROWTH
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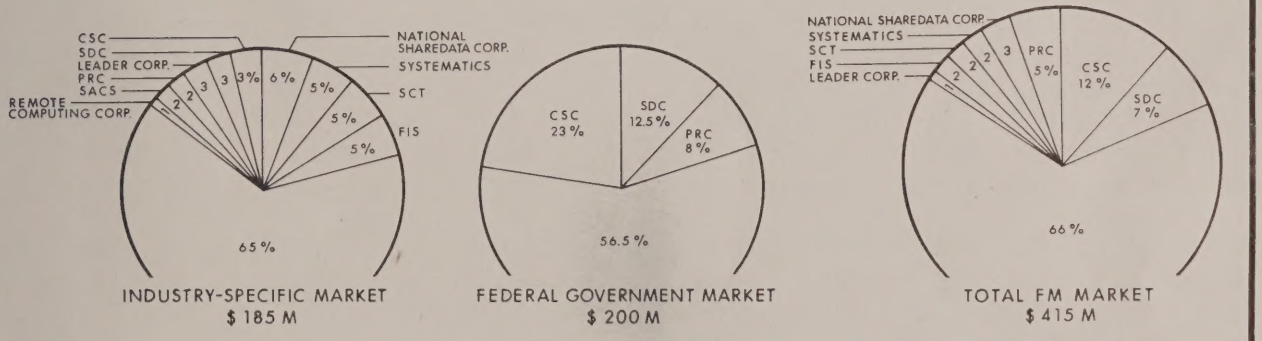

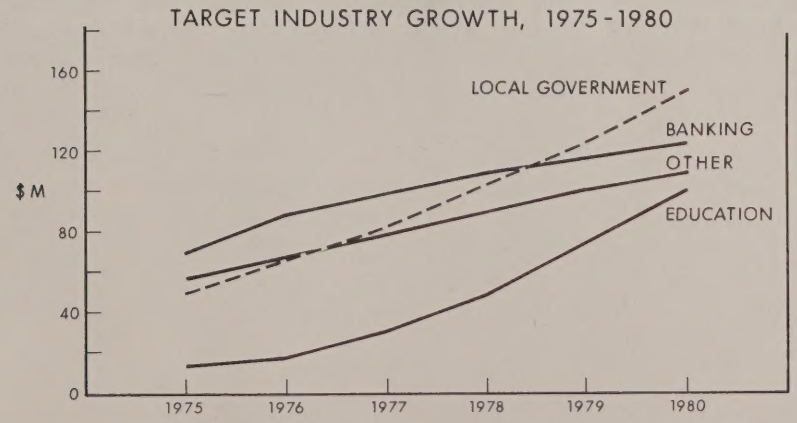

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• WITH AN EYE TO AVOIDING DOWNTIME DISRUPTION, SPERRY UNIVAC has produced an intelligent key entry system for its supermarket checkout system product line. With the new AccuScan key entry system, should the system's processing center fail, the register can continue to process orders and cope with food stamps, checks, and taxes. When the "control center" comes back on-line, it can then retrieve information on item movement, store sales, and checker efficiency. It can do office accounting and check verification as well. An 8 checkout Key Entry System's price is $42K plus maintenance. But the price can rise with up to 24 registers attached to the AccuScan Control Center . . . and such options as an 18-character dot matrix display, a remote cash drawer, coin dispenser, stamp dispenser, electronic scale adapters, and a Universal Product Code scanner.

• INTEL HAS GIVEN BIRTH TO A "SECOND GENERATION" OF SINGLE BOARD COMPUTER WITH the SBC 80/20. The 7x12 inch board operates as an 8-bit general-purpose computer, says Intel, and sells for $52,000/100 or $895 apiece (with power supply and rack). The new model differs from the SBC 80/10 in its reduction of CPU real-time loading and its flexible means of scaling-up computing power.

• UP ONE SIDE AND DOWN THE OTHER . . . IBM this month lowered purchase prices on some equipment, raised rental on others. Key-entry equipment purchase prices were reduced by 25% on September 20, including the IBM 029 card punch, the IBM 129 card data recorder and the IBM 3741 data station/programmable work station. Then, just ten days later, IBM General Systems Division raised rental prices on much of its equipment by 5%, to go into effect next January 1. Said GSD, the increases will affect all products except the 5230 data collection system, the 5447 disk unit, eight new S/32 models introduced September 14, and the S/3 Model 15D. Except for System/32 and the IBM 5100, most System/3s and the System/7 CPU, maintenance prices will be raised 15% as of January 1, also. In addition, starting then the two-year lease rates for the 3740 family -- the same one with purchase prices lowered on September 20 -- will be increased about 5%. All in all, the IBM actions point to further emphasis by IBM on the outright purchase of its equipment . . . and a general trimming of its rental base. For a reason, no doubt.

• WE'RE GONNA GROW OUR OWN, SAID BASIC/FOUR, and with that began manufacturing its own microprogrammed CPU and introduced a new top-of-the line system, the System/700. The new system can ride herd on up to 16 terminals, and offers ten times the mass storage as the next biggest system in the Basic/Four stable, the System 600 (100-400 megabytes). The System/7 CPU can address up to 128K of MOS memory, comes with an 8-page firmware set, and has a cycle time of 600 ns. The minimum configuration -- CPU, 4 VDTs, 300 lpm printer, 64K memory, and two 50 megabyte disk drives -- will sell for $115,000 and be available next March. "By manufacturing our own equipment," says T.J. Smith, President of Basic/Four, "we will be able to design in features that our worldwide direct marketing force sense a need for in our market. OEM-supplied products are developed without that advantage." The new system, he added, will be directed primarily at first-time users . . . but "We are directing a portion of our marketing efforts to companies that use service bureaus and want to move their data processing/files in-house." Hear that, boys?

• ANOTHER MINI MILESTONE WAS REACHED BY DEC RECENTLY, when the Maynard mini mogul delivered its 50,000th LA36 DECwriter II hardcopy terminal. DEC boasts that it's the first mini maker to ship 50K of any single computer or terminal device.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" OCTOBER 18, 1976 • VOL.12,NO.6 P.J.McGOVERN,PUBLISHER

State of the services message

COMPUTER SERVICES/SOFTWARE INDUSTRY TO TOP $5 BILLION THIS YEAR; REVENUE GROWTH TO AVERAGE 20% YEARLY BETWEEN NOW AND 1979

In olden 1968, notes IDC in a recent study completed for the Association of Data Processing Service Organizations (ADAPSO), some 1,400 firms were bringing computer services of one type or another to market and racking up annual revenues of $1.59 billion in the process. But by 1975, the number of firms had mushroomed to 2,500 . . . and their revenues had grown even faster, to $4.58 billion. Now, says IDC, that ADAPSO milieu will actually see an acceleration in revenue growth -- from 16% annually from 1968 to 1975 -- to 20% for the years 1976, 1977, and 1978. At that rate, computer services in toto would top $10 billion in 1980.

Taking a broad definition of computer services -- including outside computer processing, facilities management, software, EDP consulting, and I/O services -- IDC cites these major reasons for this accelerated revenue growth:

- The market is maturing. Users phasing into DB/DC are doing so in a deliberate manner . . . considering their "make or buy" options objectively. Cost consciousness is king.

- Leading service firms are targeting discipline/industry-unique markets . . . providing products that can be more productive and more economical than the home-grown variety.

- Vendor-supplied software packages are finding increasing acceptance.

- For many users, the next three years are expected to be relatively stable on the hardware side (although less so since the advent of the 138 and 148). IBM's VS line will probably not undergo major changes — changes which can monopolize management attention and spur new acquisitions.

- The growing use of distributed processing -- with its emphasis on local solutions to DP processing problems -- may provide breezier markets for fast-footed computer service firms.

Expected to lead the computer services industry in this accelerated revenue growth and attendant profitability, says IDC, will be the large-size processing-type firms and the medium-size software vendors.

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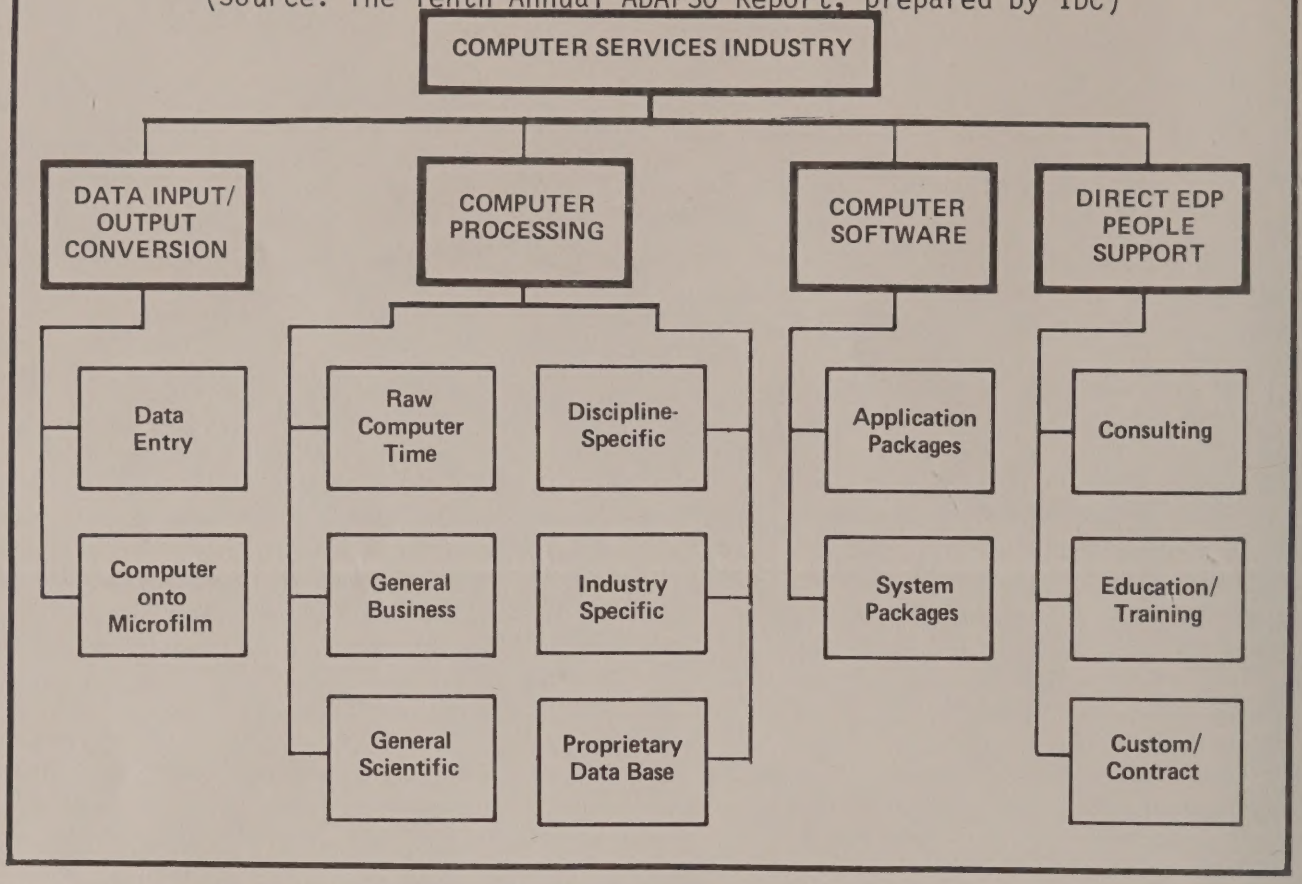
COMPUTER SERVICES PRODUCT ARRAY
(Source: The Tenth Annual ADAPSO Report, prepared by IDC)



Hardware complement

In computerdom, services play an important economic role. They add utility to hardware systems . . . filling in the crevices left by mass production to general-purpose standards. But, they are thereby also affected by the same forces of technology that relentlessly drive the hardware business. Thus:

+ The advancing technology and dropping costs of mainframe and mini manufacturers will focus in the near term at the small business level . . . and, for the first time, many users will have the option of forsaking the data center service for an in-house computer.

+ In the longer term, the hardware trends -- microprocessors, microprogramming, MOS memory -- will continue, allowing hardware manufacturers to compete in ever narrowing, specific market segments.

+ Already, many services companies are developing dual independent hardware and services business . . . and, as a corollary, many hardware firms are stepping up their services offerings.

Hardware systems, then, will begin to fill those crevices formerly the domain of the computer services firm. To that, services vendors will counter with services and software offerings tailored to even more specific applications . . . which in turn will be countered by the hardware makers with more microprocessors, terminal networks, and so on. Round and round the competition will run, with the system with the greatest utility and economy gaining dominance.

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Industry structure

In the 1976 Annual Report on the Computer Services Industry, IDC presents the results of an in-depth survey of 200 services vendors offering both "processing" services and "software" services (chart, page 2). For analysis, this random sample was further subdivided into large (over $10 million 1975 revenues), medium ($2-$10 million), and small (under $2 million) companies. The largest 11% of the companies, notes IDC, accounted for 73% of the industry's revenues.

(Companies providing both "processing" and "software" services were placed in the category from which a majority of their revenues accrued.)

A detailed financial analysis of the three sizes of "processing" companies indicates, says IDC, that firms "with processing revenues greater than $10 million are above the threshold to realize economy of scale benefits. A total of 82% of the large companies achieved gross profit margins greater than 5% while this percentage drops to 62% of the medium companies."

On the other hand, the "software" services showed better margins in the lower ranges . . . more related to the 1975 recession than economies of scale. Also perhaps because of the recession, "software" companies generally fared better than their "processing" counterparts.

The revenues and gross profit margins (gross profit/revenues) are presented below, revenue growth for the industry as a whole on page 5. Behind the numbers and curves presented here and in the ADAPSO report in more depth, IDC notes some significant trends and differences among the various generic types of services:

- Large processing companies mentioned that the major factor fostering growth for them was the cultivation of new customers. Next was the development of new or more specialized services. Specialization turned out to be the most popular growth strategy implemented.

- Medium processing companies also considered the major growth factor to be the cultivation of new customers -- but for existing products. Next came mention of the development of new products. A minority mentioned industry specialization as a growth strategy.

- All software companies placed heavy emphasis on finding new customers for existing products. The large software companies tended to be serv-

COMPUTER SERVICES 1975 REVENUES AND PROFIT MARGINS
(Source: The Tenth Annual ADAPSO Report, prepared by IDC)

Division	# Cos.	$M Revenues	% Growth	Profit Margin
Large Processing	42	$1,765	18%	13%
Medium "	135	625	10	7
Small "	1,380	900	12	8
Large Software	13	$ 575	19%	8%
Medium "	85	370	21	11
Small "	895	345	19	11
TOTAL	2,550	$4,580	16%	

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SERVICES INDUSTRY STRUCTURE BY PRODUCT REVENUE
(Source: The Tenth Annual ADAPSO Report, prepared by IDC)

PROCESSING PRODUCTS

Subcategory	Company Size Large	Medium	Small
Raw Computer Time	7%	7%	6%
General Services:	32%	36%	44%
Business	24	30	43
Scientific	8	6	1
Specialty Services:	61%	57%	50%
Discipline-specific	12	11	12
Industry-specific	35	42	33
Proprietary Data Base	14	4	5
TOTAL	100%	100%	100%

SOFTWARE PRODUCTS

Subcategory	Company Size Large	Medium	Small
Software:	56%	83%	85%
Application Packages	12	27	46
System Packages	31	24	11
Custom/Contract	13	32	28
EDP People Support:	44%	17%	15%
Consulting	38	15	11
Education/Training	6	2	4
TOTAL	100%	100%	100%

ices conglomerates offering consulting -- and some processing -- as well as software. The medium and small companies were primarily into offering straight packaged software products.

- All processing, but especially small processing companies mentioned hardware competition as a major influence on them. Large companies also mentioned it, for much of their business comes from large computer sites, where there's always a temptation to bring all DP in-house.

- Data transmission methods for computer processing firms varied by size. For large companies, 82% of their processing business was transmitted by data link. Medium companies, however, utilized data links in only a third of their business (two-thirds transported by courier); small companies relied heavily (81% of their business) on courier.

The chart above shows the structure of the computer services industry by 1975 product revenues. Note the preponderance of specialty services among "processing" products . . . the shifting mix of software packages/EDP people support as software companies get smaller.

IDC's overall services revenues forecast through 1978 is plotted on the chart on page 5. But note . . . .

IDC has traditionally examined the computer services industry from the processing side . . . and its market research reports often refer to the three-by-three matrix shown in white on the chart. For this reason, separate IDC revenue forecasts for batch, autotransaction, and remote raw power processing have been superimposed on the ADAPSO forecast.

As the charts illustrate, the highest rates of growth for computer services will be logged by software packages and specialty processing services.

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COMPUTER "PROCESSING" SERVICES REVENUE FORECAST

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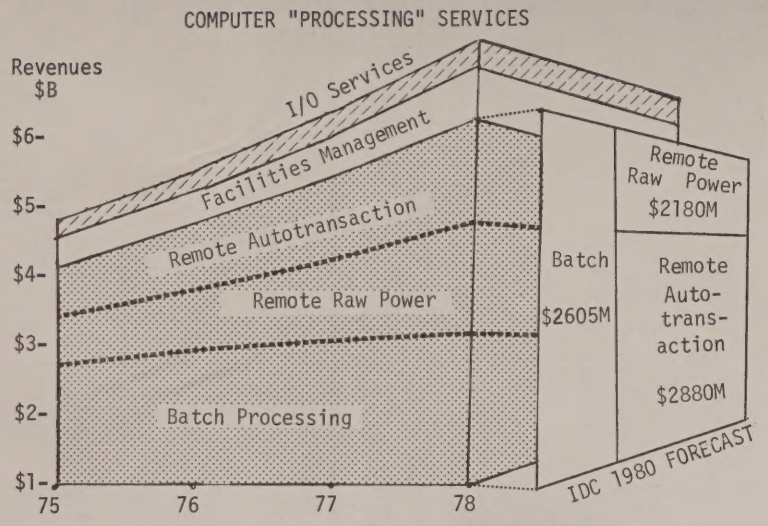
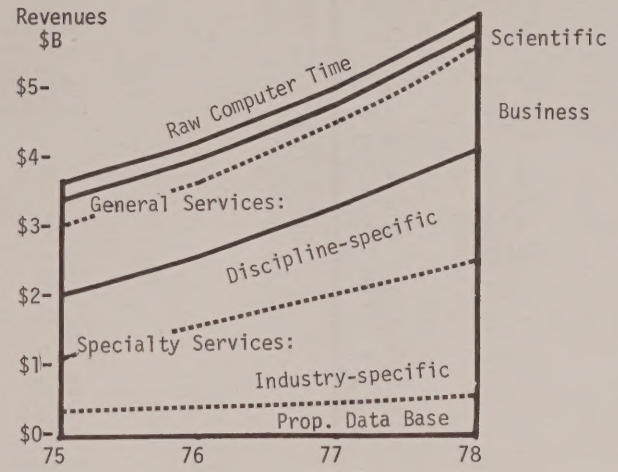


	Batch	Remote Batch	Rair
Raw Power	2%	9%	15%
Transaction Processing	52%	2%	11%
Data Base Inquiry	1%	1%	7%



Top Six Suppliers -- 24% of 1975 Revenues

Control Data	7.1%
Automatic Data Processing	5.4
Electronic Data Systems	4.1
General Electric	3.5
NCR	2.1
Tymshare/UDC	1.8

Also important (1% or more): Bradford, Bunker Ramo, CSC, McAuto, National CSS, National Data, UCC

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The marketplace

In the ADAPSO report, IDC examines trends in user markets based on company size. The upper market consists of the "largest enterprises and institutions using and operating large-scale computers." It includes some 1,500 U.S. organizations and accounts for over half of all user spending on EDP goods and services. The middle market is made up of firms which operate their own computers but have not migrated to large-scale machinery. It encompasses 20,000 companies using $10 billion worth of computers at 12,000 sites. The lower market consists of those 600,000+ firms with less than 250 employees and $25 million annual sales.

IDC notes:

- The upper market will experience significant growth in DBMS packages. About 84% of the companies in this market now use some kind of DBMS on approximately 15% of their workload and will increase usage to 50% in the next two years. Outside processing, on the other hand, will decrease as users go in-house; IDC foresees increased vendor specialization and "backward integration" (vendors supply some hardware).

- The middle market is the most stable of the three — partly because of the lack of new hardware announcements during the last two years but also because many users have developed mature DP systems which they don't now wish to tamper with. Many companies have single locations -- thus no need for new applications in data communications/networking. Selected industries are being served by industry-specific processing services; but software penetration is still slight (higher marketing costs still present a formidable barrier to many small software firms).

- The lower market is more volatile. About 38% of the companies on IDC's Small Business Data File, for instance, use computers — but less than half do so on their own systems. "To remain competitive in this market segment," says IDC, "regional data processing service centers are offering more complete services to small businesses. Quite often this takes the form of specializing in a specific industry."

For all types of computer services, manufacturing companies provided the major portion of sector revenues; the banking industry ranked number two. Competing for third place were services for professionals, the federal government, and the insurance industry. In addition, just about half of all services revenues came from northeastern and middle atlantic states. California and neighbors were the third largest regional market.

COMPUTER "SOFTWARE" SERVICES REVENUE FORECAST
(Source: The Tenth Annual ADAPSO Report, prepared by IDC)

	1975		1976		1977		1978	
	$M	%±	$M	%±	$M	%±	$M	%±
Software Packages	250	24%	338	35%	450	33%	585	30%
EDP People Support	500	15	600	20	738	20	886	20
TOTAL	750	18	938	25	1,188	27	1,471	24
% Total Services	16%		17%		18%		19%	

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Winds of change

If there's a single message in the wealth of data presented in IDC's ADAPSO report and touched on but briefly here, it's that a service industry -- like computer services -- must complement the hard goods industry from which it springs . . . and thus may be subject to technological forces outside its own control.

Competition from without, then -- say from mainframe offerings like IBM's VS "Personal Computing" (EDP/IR,Jan.30,1976) or minicomputer alternatives like Basic/Four's System 700 (EDP/IR,Sept.30,1976) -- can be both boon and bane of a computer services company's existence. Witness how many companies mentioned hardware competition as a pertinent force on their business in the ADAPSO survey.

And how to respond? Will the computer services industry best divide and conquer in many small companies operating in noncompeting markets like the printing industry . . . or battle competition through consolidation and acquisition along the lines of the broadcast industry?

Either way, IDC says this: The future of the computer services industry lies with the expectation that its companies [whether many or few] will be more responsive to the specific needs of target markets and will therefore provide a moving and highly competitive target to its hardware competitors."

(The 1976 Annual Report on the Computer Services Industry, which analyzes the topic in depth (charts, numbers, industry breakdowns, etc.), costs $300. Readers wishing further information should contact IDC, P.O. Box 915, Waltham MA 02154).

ANOTHER TYPE OF SERVICE, ANOTHER VENDOR?

If EDP/IR reads the omens correctly -- an ADAPSO report here, a filing before the FCC there -- there may well be a bull stomping around outside the china shop of computer services just waiting for the doors to open in 1979. For that's the year IBM is released from its agreement with CDC not to offer computer serices to DPers . . . and the year Satellite Business Systems (SBS) hopes to begin its advanced communications service. We should point out:

- Tests of the SBS service are scheduled to begin next year utilizing leased lines. IBM will be the "guinea pig" . . . gaining valuable user experience in the process.

- SBS has indicated it will sell capacity to service bureaus, among others, with charges based on communications resources (ground stations, transponder capacity) used. What's to prevent IBM from buying wholesale capacity from SBS, adding value at either end of the link, and reselling it as a service -- perhaps with transaction pricing?

- Even by 1979 many medium and small service bureaus will still not be coupling telecommunications with their service products. An IBM service bureau would be well-placed to usurp their markets with a communications-based offering.

Even just as another run-of-the-mill user of SBS, an IBM service bureau should be able to put satellite communications to good use. And there are those in the computer and communications industries who refuse to believe that IBM could ever be just another run-of-the-mill user of its own subsidiary.

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• HONEYWELL HAS JOINED THE UPGRADE CLUB by increasing the speed and memory capability of its Series 60 Level 66 computers. With a reported 1/3 to 2/3 boost in processing power -- with prices remaining "essentially the same" -- the changes represent "the first step toward adjusting the performance/price slope . . . in anticipation of changing market conditions." The mainframer also stepped up memory capacity for Level 66 to 1 megabyte (.5 MB on the 66/05), and in the process stated that effective immediately 4K MOS chips are the standard building blocks of HIS large system memories. In addition to memory and performance improvements, Honeywell announced that multiprocessing configurations would now be available for all Level 66 models, and in late 1977 a new high-density (940 million formatted characters) fixed disk would be available.

• WITH A "SPRINT-SPEED" PROCESSOR AS THE SYSTEM'S HEART, Hewlett-Packard's new System 1000 should run 60% to 100% faster than former comparable models for a 9% reduction in price. Standard on the larger models and optional on the smaller units is IMAGE/1000, a data base management system augmented with QUERY, and English-like inquiry procedure. Networking software is also optional for the new systems. Prices start at $33,500 for a Model 31 with 64K bytes of semiconductor memory, a 5 MB disk, CRT display, two mini cartridge drives and cabinet mounting. Larger models can run up to twice that.

• SOME RECENT MINIPERIPHERAL IMPROVEMENTS: Wangco's new "Super T" top-loading 20 MB disk and "Super F" 10 MB front-loading disk for sale at $4,470 and $3,575 respectively in OEM quantities. In addition, DEC has introduced four new disk models ranging from the 5 MB nonremovable pack/drive combination labeled the RK05F ($6,500) to the 176 MB RP06 ($34,900).

And along other miniperipheral lines, Intel has announced the in-1670 Add-on Memory System for use with the PDP-11/70 minicomputer. The in-1670 comes with up to 4 MB, "about 4 times as much as competitive memories, in the same amount of space. The basic in-1670 contains 128K bytes and is expandable in 128KB increments.

• THAT'S THE SAME INTEL, BY THE WAY, THAT NOW SELLS A FIVE DOLLAR CPU, two of them in fact. They are the microprocessor units -- dubbed the P4040 and P4004 -- for Intel's low-cost MCS-40 Microcomputer Systems.

• WE'VE PASSED THE MAGIC 200,000 MARK, SAYS NCR about the number of POS terminals and electronic cash registers it has installed worldwide (55% in the U.S.).

• EDP/IR'S BRITISH CORRESPONDENT reports that what is described as the first microprocessor to be wholly designed and manufactured in Europe has been announced by Ferranti. Called the F100-L, a fast 16-bit single chip, bipolar device, "there can be no doubt that technically, both in its production and its performance, it is a most advanced device . . . and could provide an enormous boost to the UK computing industry." But, says IDC's man on the scene, the F100-L could prove to be less than a world-beater in commercial markets, primarily because Ferranti's playing it safe and focusing on the narrow, specialized government market. The initial price of the F100-L will be £39 ($65) in quantities of 100.

• IN RESPONSE TO A MIFFED JUDGE'S ORDER TO USE SUBPOENA POWERS IF NECESSARY, the DOJ has subpoened eight IBMers to provide foundation for documents it is currently reading into the record in the massive antitrust suit now underway in New York. Among the IBMers: Frank Cary, Hilary Faw, and others.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" OCTOBER 28, 1976 • VOL.12,NO.7 P.J.McGOVERN,PUBLISHER

Fire drill in size class six

ITEL UNWRAPS ITS FAMILY OF PLUG-COMPATIBLE 370/158 CPUS . . . JUST IN TIME TO COMPETE WITH IBM'S 370/158 "ATTACHED PROCESSOR SYSTEM"

The dust is still settling, but at least it looks like most of the jigsaw pieces in the plug-compatible CPU business have finally tumbled onto the board. Other players (CDC? Fujitsu?) may come along later to reshuffle them -- and it will be up to the users to determine their final fit in the real-life puzzle of the marketplace -- but for now, at least, it seems they're still.

But what a stormy two weeks precedes this calm:

- Itel introduced its family of 370/158 look-a-likes, offering users 370/148 and 370/158 performance at significant price savings.
- IBM announced an "Attached Processor System" for the 158 similar to the 370/168APS it announced last winter (EDP/IR,Feb.27,1976) . . . but with a more generous price break for users.
- In the same announcement, IBM quietly boosted the maximum memory for the 370/158 from 4 megabytes to 6 megabytes.
- Amdahl, first of the independent IBM CPU makers, finished its first year of business with record quarterly sales ($26M) and earnings ($7M).
- And that same Amdahl announced plans for a 50-50 joint venture with Japan's Fujitsu Ltd. to assemble, market and service Amdahl CPUs overseas.

The well-publicized Itel announcement -- cast in the glow of Amdahl's success and striking more to the center of IBM's bread-and-butter markets -- was the big show of the fortnight. But IBM's news piece gets good reviews, too -- the Giant claims its system provides from 1.5 to 1.8 times the internal performance of 158 uniprocessors at prices (CPU and memory) only 15% to 25% higher. Although the 158APs cost two-thirds to three-quarters more than corresponding Itel uniprocessors . . . that added performance may bring them into the Itel "Advanced System" range for certain compute-bound applications.

And users, as Amdahl's black-ink bottom line reveals, are more than just curious about any cost/performance breaks vendors can bring them.

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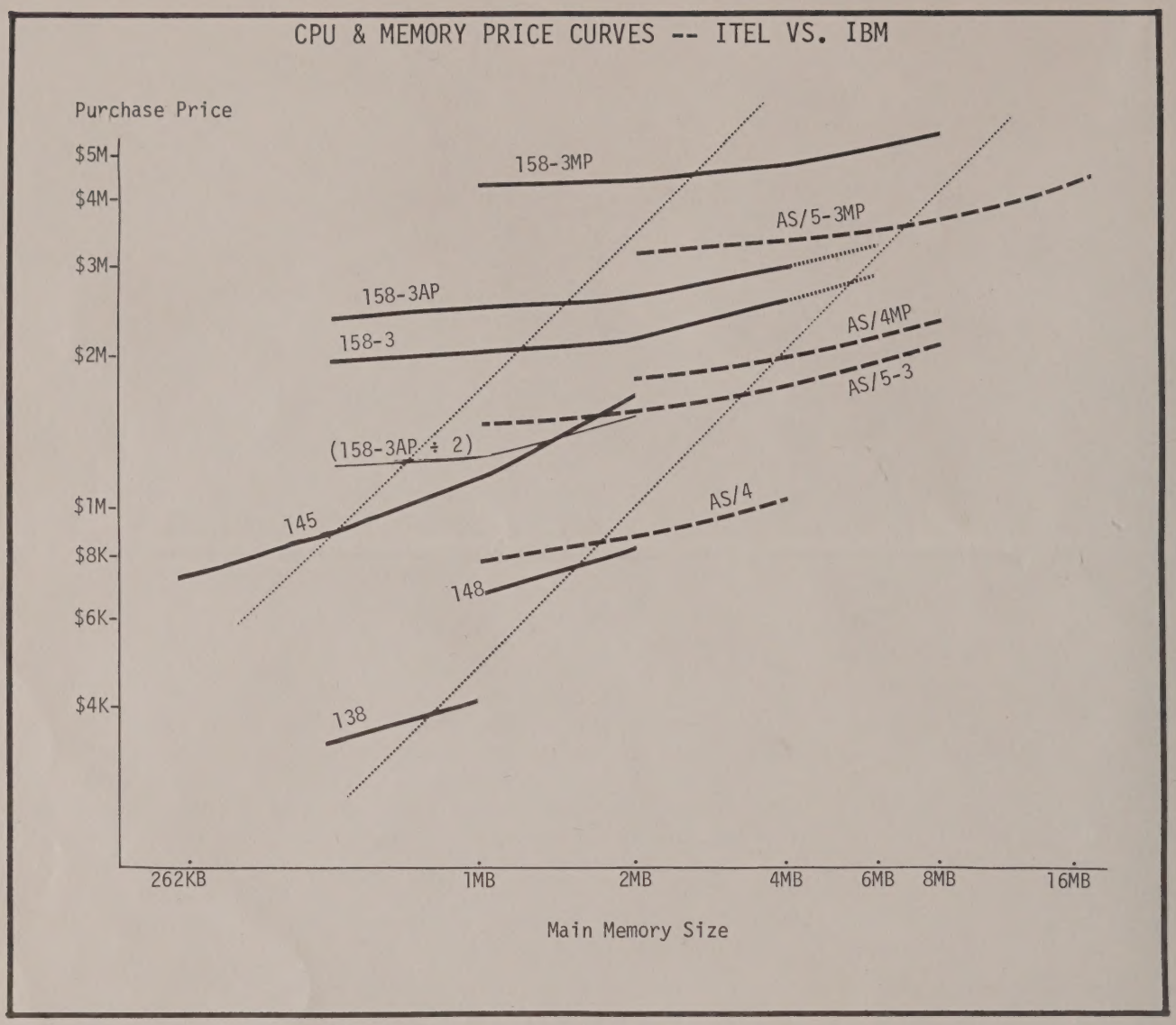

ONCE AGAIN THE GRAY SHEET'S UBIQUITOUS CPU & MEMORY PRICE CURVES tell a story of technological advance . . . and a story of products jockeying for position along new price/performance curves. The prices shown -- plotted on log-log scale -- are the purchase prices for barebones CPUs, memory, and required attachments (such as those needed to couple MPs). The Itel prices shown do not come from the company directly, but do fall within the firm's stated price zones: Equal to the 148 for the AS/4, 65% to 75% of the 370/158 models for the AS/5 models. Multiprocessor prices were derived by doubling the uniprocessor price and adding the cost of a coupling attachment ($250,000).

In addition to the normal plot for the 158APS, EDP/IR thought it might be informative to plot the price of "half" a 158APS . . . a hypothetical APS uniprocessor. There is no such animal, of course, but such a plot does give an idea of APS price/performance vis-a-vis uniprocessors. "Half," of a two-CPU multiprocessor system, incidentally, still costs more than a uniprocessor; not so for a CPU-AP system. Finally, the straight lines (dotted) intersecting the 370 and the AS/138/148 curves are simply an attempt to illustrate graphically the quantum jump in price/performance between the older 370s and the current round of new IBM and competitive products . . . the relentless advance of technology.

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Itel excalibur . . .

Itel announced six models of plug-compatible 370/158 CPUs: three uniprocessors and three multiprocessors. Four models compare directly with IBM 158 processors, two fall between the 158 and the 148. All run on and support 158 software (in fact, Itel will use 158 operator guides and manuals). National Semiconductor will make the units -- 25 in the first batch, capability to make 6/month -- and bipolar and ECL technology will be employed. More specifically:

+ The AS/4 and AS/4MP offer performance -- based on internal timings and bench marks, says Itel -- of 1.4 times the 370/148 (twice the 370/145) for the AS/4 and .7 times the 158-3MP for the AS/4MP. Memory runs in 1 MB hunks from 1 MB to 4 MB, twice the 370/148 maximum memory size.

+ The AS/5-1, AS/5-1MP, AS/5-3, and AS/5-3MP have direct IBM equivalents in performance, says Itel, but cost significantly less. The maximum memory is 8 MB (16 MB on MPs), which is twice the former 158 limit. This week's 158 memory boost, however, cuts that gulf 50% for UPs.

In addition to claiming price/performance benefits for its models, Itel also predicts fewer repairs as a result of the newer technology. Power and space requirements have been shaved, and Itel says its systems will run 9° cooler than the Giant's . . . which it claims will significantly reduce component failure. The AS models also come with more standard features and CPU channels than the 370/158s.

But Itel is selling more than a plug-compatible CPU. As one of the main suppliers of independent IBM peripherals -- and perhaps the leading purveyor of the "financially packaged" lease -- Itel can now offer its customers complete IBM systems . . . at independent prices. In a way, that's even more than Amdahl offers.

IBM escutcheon . . .

While the Itel CPUs may shine in comparison with the standard 158s in price/performance, they may lose some of that luster when pitted against the new 158APs. Although Itel claims it factored 158AP likelihood into its plans (and might consider making its own), quite such price competitiveness from IBM may not have been expected. The 168AP, for instance, costs 1.5 to 1.8 times a uniprocessor . . . while the 158AP costs only 1.25 to 1.15 times its 158 uniprocessor. And the actual "black box" -- the 3052 Attached Processor Unit -- that turns a 158 into a 158AP costs less than a third of the 168AP "black box."

Specifically, the 158AP consists of:

+ A 3052 instruction processor and 3056 remote system console (for system diagnostics). Their combined price is $400,800 purchased, $13,215 under MAC, and $12,016 under TLP.

+ New 3158 and 3158-3 CPUs for use in AP systems with prices between the uni- and multiprocessing 3158s and 3158-3s.

As with the 370/168APS (EDP/IR,Feb.27,1976), the 158APS doesn't offer true multiprocessing . . . the host processor supplies memory and I/O, the "attached" unit simply helps with the arithmetic. But for users in the MP market for reasons of computational constraints -- and not because they want the other MP benefits (security, redundancy) -- the APS could be an attractive product.

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. . . and the jousting field

In its press conference, Itel estimated the U.S. installed base of 360s and 370s at 16,000 (see EDP/IR,April 30,1976 for census) and said "We view approximately 7,000 to 8,000 of the current CPUs as a potential market for Itel's Advanced System." Actual prospects, of course, will be significantly lower than that . . . but plentiful enough:

- The Itel systems are more likely to be upgrade machines than one-to-one replacements for IBM systems . . . most attractive to 145 users topping out on purchased machines or with third-party leases about to expire. EDP/IR estimates nonrental U.S. 145s to number about 1,000.

- A recent study (see next story) on user acceptance of the 370/138 and 148 indicates that midrange users are accelerating plans for new acquisitions. And a preview of IDC's annual survey of user spending plans indicates that many midrange sites, pressing their systems to the limit, could absorb new hardware quickly.

- By profferring an upgrade machine, Itel can take advantage of IBM selling efforts by converting users that IBM has already convinced to upgrade. This may be easier than persuading users to shed the comfort of IBM's Reliability-Availability-Service cloak just to swap CPUs.

- With perhaps 1,000 customers of its own operating Itel marketed memory, 3330 disks, and 370s on "finance" leases, Itel has a built-in marketing target. Rather than impact its current "leasing" of 370/158s, Itel expects the AS simply to expand the range of products and services it can provide its customers. And placing CPUs should surely help in the marketing of the peripherals lines.

- The market outside the 370/145 bulge in the IBM base (Itel expects that 40% of its business will come from the AS/4) will also yield prospects. Itel's multiprocessor prices bring that capability to a new spectrum of users -- less than 10% of IBM's 158s run in MP configurations now -- and, in the process, provides a greater range of alternatives than IBM.

The IDC study of 138/148 acceptance indicates that users view these systems as short-lived . . . with a brisk marketing cycle of 3-4 years. As a result, many are opting for the 4-year lease plan. This in turn could mean that the most popular method of acquiring an Itel system will be through the company's 4-year "conditional sale" (all Itel leases are considered sales for risk and accounting purposes). By Itel's own figures, though, a 4-year lease at 11% interest on an AS/5 with 2 MB is only 4.5% lower than an equivalent 158 on a 4-year IBM lease. And although Itel calculates the ultimate savings for the user over a 7-year life span would be almost $1.5 million in this case . . . that 7-year span may be overly optimistic and the overall cost savings not so great.

But Itel also points out that because of the "new production" status of the AS models users can take advantage of investment tax credits. The only IBM models currently in "new production" are the 115-2, 138, 148, 158-3, and 168-3; the 115 is in "limited new production," all others are "not in new production." In addition reminds Itel, at the end of the lease period the Itel user will own his AS model -- again not the case under the IBM 4-year lease -- and can presumably take advantage of its residual value in trade-in or resale.

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AND YET ANOTHER KIND OF "ATTACHED" PROCESSOR

EDP/IR muses from time to time about the nature of systems architecture, "which continues to digress from the classical mix of CPU, memory, control circuitry, and I/O" (EDP/IR,Sept.25,1975) . . . and sees the day when computers are really collections of special- and general-purpose processing "engines" hanging off a central memory and performing computer-room functions in a distributed way. It seems to be where the chip makers and microprogrammers are taking us.

And EDP/IR considers IBM's 158 and 168 Attached Processor Systems to be precursors of this "engines" and memory architecture. IBM's toe-in-the-water.

As if to underscore this theme, the day after announcing the 158AP, the Giant went and announced another processing "engine" that can be hooked onto the big IBM computers . . . the 3838 Array Processor, which supersedes the little-known IBM 2938 Array Processor first shipped in 1968. A vector processor (see EDP/IR,Sept.30,1976), the 3838 is designed primarily for use in seismic analysis. The host 158 or 168 first accepts the data recorded in the field on magnetic tape then feeds it to the 3838 which processes it according to a set of algorithms stored in a special 16 KB control store. The 3838 also has main memory of 262 KB, 524 KB, or 1,048 KB.

By itself, the new array processor is no big deal . . . it has limited market appeal and, admits IBM, no new technology. (In fact, it falls close to the 145 CPU & memory price curve; IBM won't divulge its memory technology.) But, again, it's an example of the "engines" and memory architecture. Its forerunner 2938, for example, was hardwired to the host, had no memory of its own, and was not microprogrammed . . . unlike the 3838. Five functional elements -- including a channel interface that handles I/O from the host, the bulk storage, a data transfer controller that manages data movement within the 3838, an arithmetic processor, and a control processor -- distribute the functions of the system. (The 3838 is supported by the host under MVS and a new access method called Vector Processing Subsystem; IBM doesn't say what the host system overhead is.)

So, while the 3838 may be a minor advancement in the IBM product line -- and maybe a way for IBM to recycle processing components -- it may also be a "footprint of the future." EDP/IR suspects that there will be more such footprints, cast by the men from Armonk, coming along soon.

Goading the Giant

First Amdahl, now Itel. Is it a long-lived phenomenon? Or is there simply a "window" late in the IBM product cycle that gives leaner, quicker competitors access to the IBM base with their new technology? And are there other ad hoc vendor combinations that will follow the PCM-CPU lead, turning such products from anomaly to habit? If so, how long will IBM allow this trespass? On that score:

- IBM is edging the industry toward a purchase-oriented business. With a smaller rental base to protect, the company will be able to accommodate technological change more readily.

- IBM 360/370 operating systems have long been in the public domain, but the growing layers of ancillary software -- utilities, monitors, access methods -- required to make them run practically take the sting out of the PCM vendors' trading off of IBM development dollars.

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- Hardware in the form of attached processors, special-purpose processors, etc. (technological poultices on marketing bruises?) is another way for IBM to keep the independents in line.

- That RAS blanket is still a hair shirt for would-be competitors. The mass of IBM users are still locked in to the security of IBM service.

Antitrust aside, no one doubts that IBM could squelch the plug-compatible CPU vendors if it tried . . . or at least close that "window" and watch them become short-lived curiosities. Amdahl and Itel might be profitable . . . but not necessarily permanent.

But for the moment there may be advantages to IBM in letting them function. Now there are two more vendors to push the IBM philosophy, two more to compete with other mainframers, leasing companies, and other IBM "alternatives." The middle and upper sectors of the IBM product line -- be they made by Amdahl/Fujitsu, Itel/National, or IBM -- is revitalized. Competitors may find IBM users more loyal than ever now that the independents have lowered the price umbrella.

And whenever IBM comes out with what we once referred to as "FS," surely it will be easier to convert an Amdahl or Itel site than a Burroughs, Sperry, or HIS installation. There may be a symbiosis here.

370/138 AND 148 TO SPUR MIDRANGE 370 MIGRATION; LITTLE 360 INTEREST

In the fourth quarter of 1975 International Data Corporation, publisher of EDP/IR, sampled the migration plans of IBM users and found the 370/135 and 145 base quite stable. At that time between 85%-90% of those users had no plans to change CPUs in 1976, fewer had plans to change in 1977. Most of those that did plan to change would move to 145s (if 135), 155s or 158s; a few would simply change financial arrangements. It was a quiescent base . . . ripe for new models, as IDC noted.

Thence came the 138 and 148, and now that base is on the move. In fact, it's almost stampeding. In a mail and telephone survey of likely 370/138 and 148 prospects completed last month, IDC found:

- Only 54% of the 145 users still had no migration plans; 30% of those migrating were headed for a 148, 14% for a 158.

- Fully 50% of the 135 users had designs on a 138, 10% on a 148. Only 38% had no migration plans at all.

- Two-thirds of the 125 users sampled would remain static, another one-third planned to migrate to a 138.

- The handful of 360 users interviewed showed no interest in migrating to either the 138 or 148.

The overwhelming justification for getting in the 138/148 queue, IDC found, was price . . . to the point that some users felt that IBM was finally giving them a "break." (Others saw the new price/performance levels merely as a competitive response and predicted follow-on software/applications costs.) Other factors that appealed to the users queried include the increased performance of the two models, the better memory price, and the large reloadable control store . . . but mostly it was the bucks that counted.

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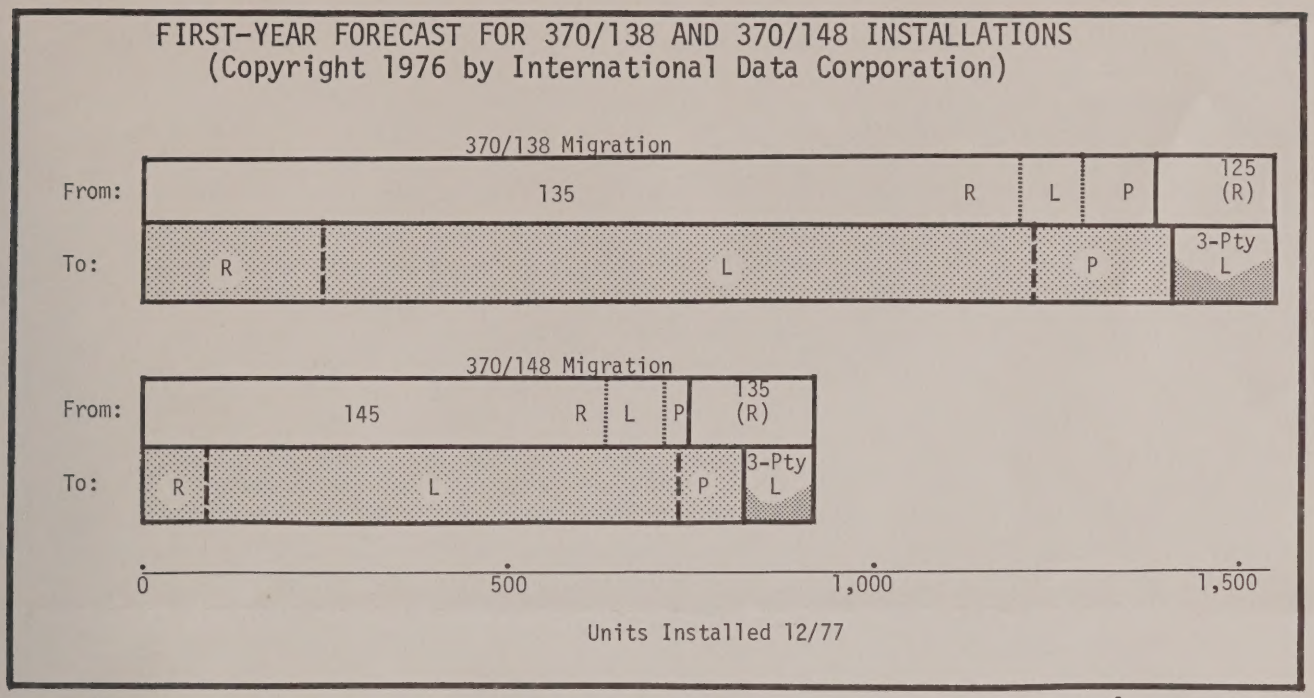

(In a way, that new price level and the accelerated migration it's causing constitute a mixed blessing for Itel. It means there's more upgrade activity on which to draw . . . but a tougher IBM model to intercept.)

Forecast for the eights

Based on study of previous migration patterns, users' stated plans concerning the 138/148, and the past shipment history of 135s and 145s, IDC forecasts brisk shipments for the two models early in the game. Indications are that their order rate is strong and that an 18-month backlog is not unreasonable to expect. The near-term forecast and migration activity is presented in the chart above.

Some of the trends behind the numbers:

- Users see the 138/148 as 370 upgrades . . . with overtones of a "380" line to come. They predict a short marketing life for the 138 and 148 and are consequently opting for the 4-year lease plan in increasing numbers. There is little interest in purchasing the systems.

- The field upgrade offered for 135s and 145s in unpalatable. Again it's a question of what you pay for what you get.

- Users see a growing IBM commitment to the concept of the "virtual machine." This perception squares with recent IBM enhancements to VM/370 and to the large reloadable control store in the new "eights."

- Users with add-on memory find themselves in a bind since the 138/148 will not support it. Some users with independent memory have placed orders for a 138/148 anyway . . . they're willing to pay what it costs to break a contract or interface the memories.

At any rate, the 138 and 148 seemed to have sparked fire in the eyes of users . . . perhaps elsewhere for independent memory suppliers, third-party lessors, and mainframe competitors. It's yet to be seen how they affect the PCM-CPU vendors.

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• BIG COMPUTER? SURE, WE HAVE A BIG COMPUTER . . . or will in two years, says Burroughs. The new unnamed vector processor will utilize a B 7700 as system controller and run on Burroughs' Master Control Program (MCP). The company foresees applications in such areas as structural analysis, nuclear research, and meteorology. With the new system Burroughs appears to be after the prestige, "gold chip" stakes of the large scientific computing market already populated by the likes of IBM, CDC, Texas Instruments, and, of course, Cray Research. Perhaps as unusual as Burroughs announcing such a beast at all is the fact that it did so two years before the fact -- the company usually doesn't run with such a long lead time.

• WITH AN EYE ON THE EDUCATIONAL MARKET, NCR announced its 7200 Model VI, a microprocessor-based tabletop computer with 24K bytes of RAM, (4K for student programming), a CRT, and a cassette recorder. Programmed in BASIC, it will be available in 1977 for $6,995. That compares with the IBM 5100 ($8,975 minimum) and other desktop computers from Wang and Hewlett-Packard. NCR offers one option: An extra cassette recorder. IBM, H-P, and Wang offer a variety of options.

• WHAT WOULD UNCLE SAM DO WITHOUT HIS COMPUTING MACHINES? An $870.6 million favorable balance of trade for U.S. business machines in the first half of 1976 represents an increase of 1% over 1975, reports the U.S. Department of Commerce. All of that favorable balance resulted from computer exports, which were $1,219.1 million or 85% of the total business machine exports. In other categories, accounting and calculating machine exports declined 16% and miscellaneous office machines 10%. At the same time, imports of computers rose 31% to $83.0 million. In electronic components, the DOC reports a favorable trade balance of $511.4 million for the first six months of 1976, up 14% from last year. Geographically, only the Far East exported more of these goods to the U.S. than they imported. (Note: Exports do not include goods made by U.S. overseas subsidiaries and shipped abroad.)

• DATA GENERAL MAY HAVE MORE THAN ONE BIRD IN ITS SIGHTS in its proposed acquisition of Digital Computer Controls. Last November, acting on a trade secrets complaint from Data General, a Delaware court issued an injunction enjoining DCC from using the logic designs from either the Nova 1200 or DCC-16 for making Nova-compatible computers (EDP/IR Nov.24,1975). DCC appealed, posted bond, and was allowed to continue making computers . . . but found the lawsuit inhibited the raising of capital. Hence acquisition by the plaintiff -- the only out-of-court settlement the Southboro mini maker was interested in -- was amenable. With it, Data General gains some lost business and a few new customers.

And one of those customers is none other than Litton's Sweda International, to whom Data General last week announced intentions to sell its POS business. The Data General-Sweda agreement includes OEM purchases of $40 million in equipment and software from Data General . . . and, presuming the DCC acquisition goes through, more business from that end. DCC was a major supplier to Sweda.

• OTHER UNIONS WAX AND WANE: Centronics and Data Printer are off . . . Southern Pacific Communications outbid Western Union by $200,000 by offering $4.9 million for the remains of Datran. Once underway, the bidding took six minutes.

• TO THE CHICOMS: TWO CYBER 172s for oil exploration. Since the systems could be used for military purposes, the sale approved by the White House flies somewhat in the face of President Ford's statements in the Presidential Debates . . . and against some previous disallowed sales of CDC and IBM computers to Russia.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" NOVEMBER 24, 1976 • VOL.12,NO.9 P.J.McGOVERN,PUBLISHER

Recap of retail POS -- page 6

IBM ANNOUNCES SERIES/1 AS A TOOL FOR SOPHISTICATED END USERS

Q. What's IBM's future in "industrial minicomputers"?

A. IBM has trouble with the meaning of that particular term . . . but in the area of small systems, the company expects to have more entries in the future at that end of the spectrum.

Roughly 14 months after Frank Cary, IBM Chairman, made the above comment at a Chicago financial analyst meeting, IBM squarely entered the minicomputer sector of the computer industry. At its mid-November announcement of Series/1, IBM's C.B. (Jack) Rogers, Jr., president of General Systems Division, picked mid-range minis from DEC, Hewlett-Packard, and Data General to describe the major competition he expects for the company's new computer. He described it succinctly:

> It's a 19-inch-rack-mountable general-purpose computer . . . offered for purchase only and not discounted . . . directed to the larger, self-sufficient user.

It seems clear to EDP/IR that Series/1 is IBM's answer for the growing number of computer users who are at least looking at business applications that are implemented with a series of small computers rather than with one larger one, even by a large one surrounded by terminals. Not announced was the capability to handle large disk files (for a distributed data base application), and this is considered important in distributed processing. The lack of this capability looks like it's a political decision designed to keep GSD away from some of DPD's business more than anything significant technically. Spokesmen say that attaching a 3340, for example, is not difficult and at least one contract with this proviso has already been bid in the preannouncement test marketing going on since this past April.

To the extent that one-stop-shopping and service from the world's largest computer maintenance firm appeals to end users, Series/1 is a threat to the end-user revenues of the other minicomputer suppliers. And those revenues are considerable. This year in the U.S. alone, says IDC, they should reach $750 million on the sale of 20,000 units. Next year they should top $1 billion (25,000 units), in 1980 $2 billion (40,000 units). By then they will comprise 65% of all U.S. minicomputer revenues. But where once DEC and Hewlett-Packard would have account-

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U.S. END-USER MINICOMPUTER STATISTICS
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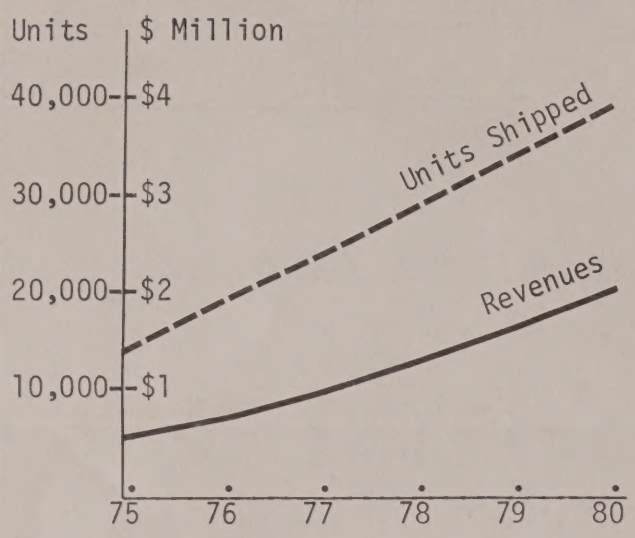
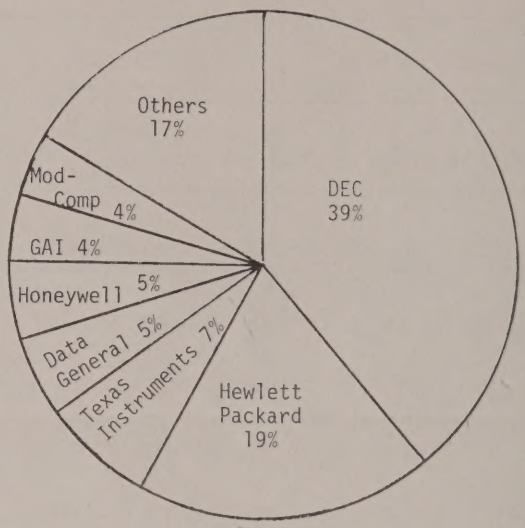
Revenues and Shipments



% Of 1975 End-User Revenues



Note -- IDC estimates that the companies listed above have the following percentage of U.S. minicomputer revenues in the end user sector: DEC = 70%, HP = 70%, TI = 82%, DG = 40%, HIS = 78%, GAI = 54%, and ModComp = 70%.

ed for half of those dollars, now there will be GSD to contend with . . . whose products this year will gross in the vicinity of $2 billion worldwide. For the smaller purveyors of end-user minis -- the Honeywells, ModComps, Varians, and others whose intake from end users is 50% of revenues or better -- that "Peachtree" unveiled last week could bear bitter fruit.

Form and function

Technologically, as is always the case when a major manufacturer announces a small computer, Series/1 is one of the hottest things around. Two different models (3 and 5) offer 800 and 660 nanosecond memory cycle times and average instruction times of 11.8 and 3.9 microseconds. "In raw performance," IBM's technical expert at the conference points out, "the Model 5 is between the 370/135 and 145."

To finish the nuts and bolts description: Minimum memory is 16KB, expandable in 16KB chunks to 65KB in the Model 3 and 131KB in the Model 5. The MOSFET memory is built from 2K(bit) chips packaged slightly differently in the two models. The CPU uses bipolar LSI with 100-to-130 circuits per module; and instructions are microprogrammed in Read Only Storage (6KB in the Model 3, 24KB in the Model 5). Series/1 is expected to compete with DEC's PDP 11/34, Hewlett-Packard's 21MX, and Data General's Nova series.

IBM also introduced a series of new (or newly designed) peripherals to fit the 19-inch rack mount. These are microprocessor-based and include a 9.3 megabyte disk with two movable data heads (similar to that in the System/32 and 3790); a diskette unit for double-sided floppies; and I/O units for sensors and communications control. A 120 cps, bidirectional, tabletop, matrix printer and a new 24-line-by-80-character display station with 12-inch CRT are also offered.

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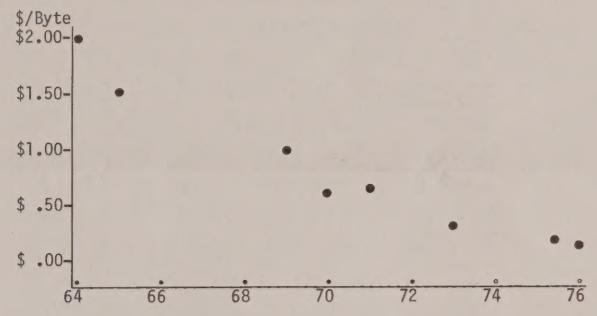
IN REMEMBRANCE OF MEMORY . . . OR, IBM SENDS A TELEGRAM

Veteran IBM watchers claim that IBM makes no sudden moves . . . that Goliath's actions can be divined if enough attention is paid to its previous hints, or "telegrams." In the area of memory prices, it turns out, a clear message was encoded in the IBM 5100 introduction in September of 1975. For the 5100 came with an implied memory price of 18¢ per byte (vs. the 26¢ then prevalent for larger 370s) . . . and by May of 1976 the price of 370/158 and 168 memory had been reduced to 17¢ per byte ($170,000/Mbyte). So the price of memory for Series/1 is worthy of note: 12¢ per byte on the average. Some historical information on IBM computers, announcement dates, and memory prices:

Model	Date	$/Byte
360/30	1964	$2.00
360/65	1965	1.50
S/3-10	1969	1.00
370/155	1970	.60
370/135	1971	.64
370/115	1973	.30
5100	9/75	.18
158/168 price cut	5/76	.17
Series/1	11/76	.12

IBM Memory Curve



(The only connection with IBM's SNA or it's new Advanced Communications Function concept, says IBM, is that Series/1 can operate in an SDLC environment. The GSD people give the impression that when they know more about what DPD is doing with SNA, they will be better able to sell the S/1 into that environment.)

Prices for the Models 3 and 5 (CPU and 16KB memory) are $4,360 and $6,165 respectively; usuable configurations will cost between $10,000 and $100,000. Maintenance runs slightly higher than 1% of total system price per month.

Attacking a new market

In practice, marketing for the new machine will be choreographed by DPD in virtually all cases since the salesman (marketing executive) of the most senior system used by a customer is the account coordinator for all IBM computer-related pitches. Thus, any 370 is senior to any GSD product, despite the number of units or dollar quantities involved. Since sales efforts (certainly at first) will be directed at putting out fires ignited by minimakers trying to steal current -- or potential -- applications from IBM's big mainframes, DPD will be singling out the hot prospects first (and then calling in the special Series/1, product-oriented, storm troops assigned to each major geographical sales territory). It looks like a good way of setting priorities in launching a marketing program . . . and a good way of keeping a certain amount of control over GSD. (All the marketing policies and decisions inherent in this announcement seem to have some connection with GSD's apparent straining of the corporate leash.)

IBM is looking to the large user who wants to buy quite a few systems and do his own thing. There is no minimum order quantity, the company says, but it is likely that customers will think in terms of multiple units since system design and development will be their responsibility -- which IBM may have considered in its pricing. During the test phase, IBM says, 20 units was the smallest order.

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THE PACE STEPS UP AT THE SMALL SYSTEMS END

Ironically, the same day IBM was announcing its high-"iron" S/1, Data General was announcing still another "generation" of soft stuff for its Eclipse C 300. Like cats chasing one another's tail, each vendor hopes to nip revenues from the other's bailiwick . . . each hopes to fill gaps in its offerings.

What is not ironic, however, is the hectic pace of life in computerdom's Lilliput -- a pace IBM will have to get used to and GSD seems eager to suffer. Just since EDP/IR's last treatise on that end of computerland (Sep.17,1976):

+ Data General announced a new operating system for its Eclipse, a new in-house cartridge disk, and a scientific version of its S 330
+ Honeywell added Cobol and Basic to its Level 6 minicomputers
+ Microdata announced a smaller version of its "Reality" business system and a new "Scribe" line printer
+ Interdata introduced shared nonlocal memory (870KB) for its computers
+ Xerox's subsidiary, Diablo, announced an 8080-based small system
+ Hewlett-Packard introduced a new line of computers (HP 1000) and added APL capability to its HP 3000
+ Nixdorf introduced a distribution accounting system for its 8870
+ Tandem Computer has added data base software to its "Nonstop" multiple processor "failsafe" system
+ Varian introduced a new family of minis that "think like mainframes"
+ DEC announced new disk drives for its PDP-8 and 11
+ Basic Four added a new model to the top of its line and entered the business of manufacturing
+ Wang Labs added memory and software capability to its 2200

So, IBM be advised, you are entering a frenzied marketplace . . . perhaps to expand it, perhaps merely to heat it up.

What you see is what you get

Users don't get much help from IBM. In the section called "Programming Support" in the technical news release, IBM describes its software . . .

> The programming support for Series/1 consists of the Base Program Preparation Facilities and the Stand-Alone Utilities. The program preparation facilities include a text editor, a macro assembler, and linkage editor. The utilities include such capabilities as diskette and disk initialization, copy, dump, patch, automatic system build, and system verification.

. . . which is not much richer than what general-purpose users were getting ten years ago. S/1 does have, however, a "broad instruction set designed to go after all application areas" and four levels of priority interrupt and a cycle-stealing channel as features. IBM says it would welcome sales to systems houses -- perhaps generated via contacts made through special work on System/32 applications. As Jack Rogers says, Series/1 "may be a little bit of a departure from the way we've done business in the past." EDP/IR agrees:

- IBM is not offering the hand-holding for which it is famous, although the service prowess of the company may figure highly in the minds of users contemplating computer networks in out-of-the-way places.

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- The S/1 is being offered as a tool, not a solution . . . with barer "iron" than that offered by many of the major minimakers, who have been cloaking their products in ever-increasing wraps of software in attempts to get some of the Giant's business.

- The product -- versus application -- orientation of the S/1 marketing thrust is new to IBM . . . and leaves open many future avenues from either GSD or DPD (Series/1-based products?).

Series/1 seems to be a product that is reactive to that gap in IBM's product line that has nurtured competitors in the chase for users' distributed processing dollars. One wonders, though, especially given that GSD is involved, just how long will IBM operate in the defensive mode? When (and if) will it go on the offensive? It has singled out a rapidly developing -- and somewhat captive -- piece of the minicomputer market . . . will it be content to remain in only this sector? Or will it move into other areas . . . with more "iron" and more software support for general-purpose use? . . . as in a successor to the System/3?

\+ + + +

Another kind of small system

BURROUGHS INTRODUCES THE B 1800 SERIES COMPUTER UPDATES THROUGHPUT WITH NEW TECHNOLOGY AND PERIPHERALS

Although it's not too likely that the new B 1800 computer recently announced by Burroughs as a successor to the graying B 1700 will compete with the ilk of GSD's just-announced Series/1 -- at least until the systems houses take a turn with the S/1 -- it will quite likely butt up against GSD products elsewhere in the line.

Promising "up to 40% more throughput for about the same price," Burroughs touts the diminutive (50% less power and floor space) System/3 competitor's power and advanced architecture. Part and parcel of the B 1800 are:

- Burroughs Current Mode Logic (BCML) -- the mainframer's answer to everybody else's ECL -- in the smaller 1800 model (1830), CTL III (for complementary transistor logic) in the others (1860 and 1870).

- The use of dynamic software "interpreters" that minimize operating system overhead in main storage by configuring "on the fly."

- Compatibility with the Computer Management System (CMS) released recently for the B 80 small business system and compatibility with Burroughs' library of Business Management Systems (BMS) programs.

- A high-speed bipolar microinstruction cache memory on the two larger models. The 4K memory operates at a speed of 83 nanoseconds.

The three models have slightly different processing speeds and memory capacity, says Burroughs, but between them can handle from 48K bytes to 524K bytes of main memory. The purchase price for a typical small system could be as low as $108,700 ($2,660 on monthly lease); for a typical larger system it could run over $550,000, the equivalent of $13,000 on monthly lease.

For the user whose interest is sparked by distributed processing, Burroughs points to the possibility of using an 1800 as a terminal for a larger mainframe in a distributed processing net (perhaps 1800s will meet S/1s, after all).

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MESSAGE FROM NCR: IT'S NEW GENERATION TIME IN RETAIL POS AS THE NCR 2151 RETAIL TERMINAL DEBUTS AT NRMA CONFAB

When NCR said its assigned workshop session at last month's Phoenix meeting of the retailer's EDP conference would be devoted to a product announcement, even attendees not previously briefed knew something a little unusual was in the offing. So observers were set to thinking when the audio/visual runthrough of the cash register's history was followed by a statement that the new 2151 being announced was "one of the most important products in the company's 92-year history."

And whether you think of it as an up-to-date (electronic) cash register . . . or as a small, communicating computer with cash drawers attached, the 2151 marks a new generation (or at least 1.5 of one) for retail point-of-sale equipment.

Some of the new features include:

- From 32K to 64K Random Access Memory for customer applications with a special 256 byte memory for hard totals. The terminal also comes with a battery attached to the memory board to protect totals in case of power failure or board removal. (The battery lasts 200 hours.)

- NCR-assisted programming . . . the retailer fills out standard forms describing details of store operation and functions needed, and NCR converts the information into programs recorded on mag tape cassettes. The user also has control over design of the keyboard.

- Capability for the retailer to make minor programming changes via the keyboard of the terminal or the minicomputer (725 in-store controller).

Designed as an upgrade for NCR's 280 retail terminal, the 2151 links to the NCR 725 in-store controller/minicomputer, which can handle up to 350 terminals. The price for a basic 32K 2151 is $4,145; deliveries are scheduled for early 1977.

Getting here from there

By the time 1970 rolled around, retailers were talking seriously about POS in their operations . . . and lots of manufacturers were jumping on the bandwagon: Pitney Bowes had teamed up with inventive Alpex; Singer had financed a product for its own stores by signing Sears Roebuck; small companies such as Nuclear Data had sprung up to capitalize on the market; electronics manufacturers Motorola and National Semiconductor eyed the potential; Sweda and Olivetti, strong in the European cash register market, saw a way to penetrate the U.S. . . . and NCR, with an estimated 70% of all the cash registers in the free world, boasted factories full of the sophisticated tools and dies it took to precision manufacture all the parts it needed to pump out its registers and keep older ones fixed.

A race began. It saw IBM enter the marketplace; it saw some of the would-be participants drop by the wayside or trim down their plans; it saw NCR completely scrap its mechanical register manufacturing capability, thereby guaranteeing that only electronic registers would be acceptable in the marketplace.

Smart operators, meanwhile, found that electronic cash registers were easy to make . . . all that was required, if you look at it a certain way, was a calculator and a cash drawer. Companies such as Data Terminal Systems began to appear in the marketplace.

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PROJECTED GROWTH OF U.S. RETAIL POS TERMINALS
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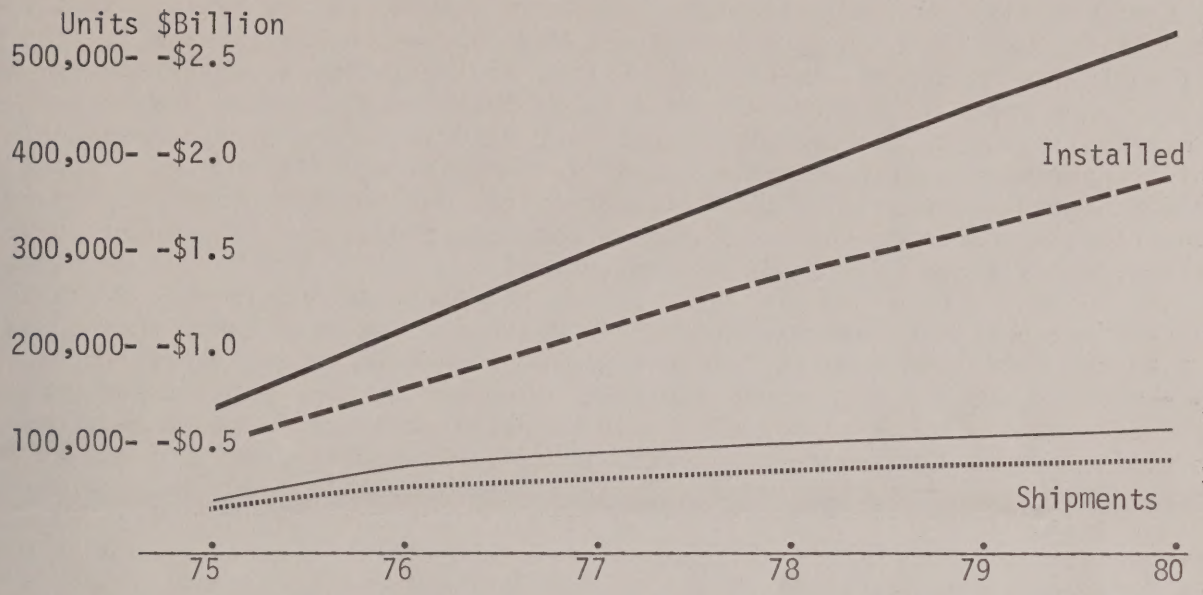

IDC's estimate of market share in General Merchandise POS Terminals as of 12/75 is as follows: Singer 44%, NCR 25%, General Instrument 16%, Pitney Bowes-Alpex 5%, Litton(Sweda) 3%, IBM 1%, others 1%.

Simultaneously, retailers started yearning to be able to capture large quantities of product data without requiring clerks to input it manually, which led to bar codes, magnetic stripes, and various types of optical reading techniques . . . about as many as there were manufacturers. Finally, the merchants standardized on the OCR-A type font and Recognition Equipment offered a hand-held scanner that could read it efficiently . . . and got the lion's share of the scanner business. So the market grew, and is forecast to grow some more. IDC estimates that by the end of the decade half a million general merchandise terminals will be installed in the U.S. worth almost $2 billion -- well over twice today's installations.

Now, NCR has put a microprocessor in its second batch of electronic cash registers -- the first simply replaced the mechanical stuff -- and has told its customers they can design the terminal as a distributed processing element in their total system. The new equipment, because of its built-in flexibility, can be made to operate like NCR's older POS terminals for customers who want to migrate piecemeal . . . and should provide more flexibility for future applications.

And that's the way progress in made. POS registers came into use first as electronic registers at new stores, then as terminals tied to controllers in those stores . . . finally, as the controllers linked the stores with central computer systems, the POS registers became terminals in distributed processing systems. Terminals at the loading docks were hooked in, as were CRTs in the offices of buyers and merchandise managers. Or so goes the "future history" envisioned by many of the retailers talking about "total systems" at the NRMA conference last month.

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Supermarket POS buffs: NCR points out that market share numbers in the last issue of EDP/IR don't include NCR terminals capable of upgrade into supermarket POS systems but operating standalone, another 10,000 units . . . and that IBM activity in this area recently may be more agressive than the numbers indicate.

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• RAIDING ROGET'S THESAURUS TO DESCRIBE IT, DATA GENERAL introduced what it calls a "heuristic" multiprogramming operating system for its Eclipse family of computers. The "Advanced Operating System" (AOS), as DG has labeled it, can control multiple concurrent timesharing, batch, and real-time operations; the "heuristic" part comes in because AOS constantly monitors all system activities and automatically adapts the system to both user priorities and past behavior of the various operations. Thus, claims DG, it is especially efficient . . . providing dynamic memory management (with different operations sharing common code) and disk allocation, synchronous and asynchronous communications, multitasking to user priorities, and a range of high level languages.

Unique to AOS is what DG calls its "process" orientation, where a process is a group of program tasks that share up to 64KB of memory and compete for system resources as a unit. (For example, a process can execute a system program like an editor or user application program.) Users determine whether a process should be permanently resident in main memory, pre-emptible (usually resident but occasionally swapped to disk), or always swappable. Batch programs, for instance, are always swappable. AOS manages the system according to what processes are on-going . . . allocating priorities and resources based on the actual job mix. A basic AOS system control module is available for a one-time fee of $2,500; AOS with most options would cost $5,000.

• IS IT BETTER TO BE "HEURISTIC" OR "THINK LIKE MAINFRAMES"? . . . because Varian Data Machines has announced a new family of computers which it says "think like mainframes." Dubbed the V77-200, -400, and -600, the three models in the series feature between them high-speed operations, cache memory, user microprogramming, and tensive I/O and data communications capabilities. Memory size ranges from 8K 16-bit words up to 1 million words (using memory mapping); prices start at $1,200 for the smallest V77, run to $22,450 on the largest.

The three models have similar architecture, but the packaging is different. The V77-200 is a processor-on-a-board, suitable for sophisticated OEM use; the V77-400 is a mid-range mini that Varian sees as an excellent "traffic cop" in a hierarchical network of V77s; the V77-600, aimed more at end users, would make a good host in a distributed processing setup. An advantage to using V77s in a distributed fashion, says the company, is their ability to share one another's main memory for operation in true distributed "ring" configurations.

• CONTROL DATA WILL OFFER CINCOM'S "TOTAL" ON ITS 3000 medium-scale computers starting in the third quarter of 1977. It will run in the user's program field length under CDC's 3000 Master 4 operating system on CDC 3170, 3300, and 3500s. Along with TOTAL, the company will offer an interactive query language processor called "Athena" . . . so users can utilize TOTAL without planning their queries at design time. TOTAL costs $850 under monthly license with a one-time charge of $1,000 and a paid up fee of $31,000, use of "Athena" adds 14% to that.

• BIG AND SMALL FOR BURROUGH: 2,000 B 80 small business systems ($18 million) have been ordered by the National Westminster Bank in England; a $5.6 million B 7700 will go to Bankgiro, a financial clearing house in Amsterdam.

• IBM HAS EXPANDED THE MEMORY SIZE OF ITS SYSTEM/3 MODEL 12 . . . bringing to five the number of Model 12 memory sizes, which start at 32K bytes and now run to 81,920 and 98,304 bytes. The new models rent for $1,862 and $1,967 monthly or can be purchased for $64,215 and $66,915. Shipments should begin next June.

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"THE GRAY SHEET" NOVEMBER 12, 1976 • VOL.12,NO.8 P.J.McGOVERN,PUBLISHER

A quick scan of supermarket POS -- page 6

IBM ANNOUNCES NETWORK CAPABILITY UNDER SNA WHILE SPERRY UNIVAC PROPOSES *ITS* NETWORK ARCHITECTURE

In the near term, our future strategy is to build and extend the communications architecture you have seen today in the direction of networking and distributed processing. It is fully expected that terminals, remote concentrators, and host front-end systems will begin to employ intelligent components, such as microprocessors. The standardization of communications architecture will allow this to occur in an orderly and timely manner, with continuing improvement as technology permits.

-- Neil Gorchow, Sperry Univac VP
at product announcement, 11/10/76

So many computer companies are announcing, comparing, and promoting "architecture" that it's probably difficult now and then to tell whether you're being offered help, houses, or hot air.

-- Sperry Univac brochure on Distributed Communications Architecture

One day IBM, the next day Univac . . . and all of a sudden networking users have a cleaner picture of just what the mainframers have in mind for them. IBM's SNA -- an acronym for "Systems Network Architecture" that has been in the vocabulary for two years now -- finally took on context with a slew of software products announced this week. Then, on the day after the IBM release, Sperry officially declared its intentions -- via Distributed Communications Architecture, or DCA -- regarding data communications and its product line for the next 15 years.

- IBM's new software products (and 3705 enhancement) will allow more of the communications function -- including computer-computer discourse -- to be lodged in the 3705 front-end controller. By the nature of the software, however, network control will still be linked to host CPUs.

- Sperry, on the other hand, will support present and future networks in which the network controls itself. Considering the multivendor aspect of many Sperry sites -- where a Univac host controlling a network with IBM computers on it might cause a few management shivers -- such network independence is probably a must.

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With either type of control, the message is this: By 1978, when the products announced this week become available, users ready for the more complicated, sophisticated networks that SNA and DCA embrace should find the tools and uniform procedures ready for them. Users ready to network before then -- or networking now -- have a blueprint for expansion. In any case, IBM and Sperry have added substance to the shadows of tomorrow's computer-communications landscape.

Software city

To implement what it calls the "Advanced Communications Function," IBM announced a spate of program products as extentions to its SNA "enabling users to link multiple computers together in a data processing network." They include:

- Advanced Communications Function (ACF) modules for VTAM and TCAM access methods -- host-resident under SNA -- and for the Network Control Program (NCP/VS) that resides in the 3705 communications controller.

- Multisystem Networking Facilities (MNF) for linking multiple CPU hosts operating under the various access methods and for the automatic routing of data. (Without MNF, line switching is performed by the operator at the host computer or by user-written procedures.)

- A Network Operation Support Program (NOSP) for consolidating the routing of commands and allowing operator control of network functions from 3270 consoles; a System Support Program (SSP) for generating ACF/NCP/VS in a host computer before loading into the 3705.

- Network Job Entry (NJE), an enhancement to JES 2 under OS/VS2 MVS, that allows the "loose-coupling" of CPUs connected by communications lines.

Perhaps because the software products will be optional under its VS operating systems (or perhaps because of inroads by the plug-compatible CPU makers), IBM unbundled these program products -- and the monthly license fees in a network can add up. Each host in a multi-host network, for instance, must have the appropriate ACF/VTAM or ACF/TCAM and Multisystem Networking Facility (MNF); each 3705 must have the appropriate ACF/NCP/VS. In addition, hosts and controllers must also sport the regular VTAM/TCAM and NCP required by SNA. Users will also end up paying -- one way or another -- for the added tax on system resources that the new ACF modules and support programs levy.

IBM "ADVANCED FUNCTION" MONTHLY LICENSE FEES

Product	Usage	DOS/VS	OS/VS
ACF/VTAM	With VTAM, one per host CPU	$125	$200
MNF	"	325	600
ACF/TCAM	With TCAM, one per host CPU	-	$200
MNF	"	-	800
ACF/NCP/VS	With NCP/VS, one per 3705	$100	$100
SSP	With ACF/NCP/VS	50	50
NOSP	With ACF/VTAM	-	125
NJE	With JES 2 under MVS	-	$500

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For their money -- and forbearance in the face of so many new acronyms -- users will be able to:

+ Link up to 4 CPUs in one location to a 3705-II, 2 CPUs to a 3705-I
+ Access applications on one host from terminals (or other applications) on another host without sending data through intervening hosts
+ Communicate from one computer directly to a remote computer via 3705s
+ Use the 3705-II as a remote communications controller, concentrating data from multiple lines before transmission to a host's 3705

Previously, SNA supported only single-host networks, and a 3705-II could be shared by only two CPUs. Now the Armonk mainframer will support more complicated nets . . . and in the process, presumably, clinch the loyalty of more customers, increase revenue from its program products, and sell a few more 3705s.

A "second source" for networking

Sperry Univac's pronouncement on computer networking was multifaceted, involving hardware, software, data protocols, and a statement of corporate intent. The bill of particulars included:

- Distributed Communications Architecture (DCA) -- a development strategy and general plan for Sperry network support over the next 10-20 years. DCA delineates the relationship (logical and physical) between components in the network; the relationship between hosts, terminals and other processing nodes; and line protocols and interfaces. It's a "design concept," not "a product in itself," says Sperry . . . a framework for evolution and talisman of the company's commitment to networking.

- TELCON -- an "intelligent distributed communications system" and the first product designed to implement at least some of the concepts of DCA. TELCON includes hardware, software, peripherals, and use of a bit-oriented line protocol dubbed Universal Data Link Control, or UDLC, which encompasses presently-known variations of ADCP, HDLC, and SDLC. A TELCON system can perform as a front-end for 1100 Series processors, a network nodal processor, or a remote concentrator.

- A Distributed Communications Processor -- the heart of TELCON, which may consist of CPU, remote I/O controller, diskette, cartridge disk, mag tape, Scanner I and II communications controllers, and a remote control module. Memory can be expanded in 16KB increments from 32KB to 128KB. A DCP can support up to 128 full-duplex lines, and multiple DCPs may be connected together.

Under the concepts of DCA, and specifically TELCON, networking capability is provided for star, hierarchical, and distributed ring networks; functions that can be distributed to the network include user applications -- such as validation and format control -- as well as communications control. As a result of such distributed processing and the use of UDLC, says Sperry, line costs host system overhead can be reduced.

In addition to distributed network control, DCA will support selected terminals and host processors of other vendors. So far, says Sperry, that means only IBM -- it's one of the prerequisites to living with the Giant -- but other mainframe or mini/terminal suppliers would be considered depending on market demands.

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From the user side . . .

Neither IBM's extension of SNA or Sperry's revelation of DCA springs from a vacuum. Dropping hardware costs, rising line charges, and users' future needs are all involved. As one Univac spokesman put it: "We've had users networking with DCA for some time. We just didn't call it that. But now we'll bless the concept and take on the responsibility of supporting it." Neither offering will be available until 1978 or so . . . and for many users that will be soon enough. "It'll be ready before we are," said more than one user to EDP/IR.

The fact that users aren't massing at the gates of SNA is supported by a recent study by IDC of its acceptance among 370 users. Within the sample:

- The impact of SDLC to date has been negligible, with the heaviest usage in the retail sector. By 1977 say respondents, only 17% of their terminals will utilize SDLC.

- VTAM is used at only 8% of the sites surveyed, mostly on 158s and 168s. And by 1977 still only 17% of the sites surveyed will utilize it.

- Although only 7% of the users in the survey currently utilized SDLC, 50% said they would someday . . . but no time frame was given.

In addition, the report found that independent penetration of the 370 communications controller base was about 20%, with Memorex leading Comten 2-1. That penetration is expected to remain steady -- with Comten's products making inroads against Memorex's older 1270 products until the newer 1380 shipments build up. (Comten and Memorex both told EDP/IR that the SNA upgrade would have little effect on their sales other than endorsing their products' more versatile features.) And meanwhile, IBM 370Xs will supersede the diminishing base of 270X controllers.

So, despite all the juicy networking capabilities announced this past week, users won't be implementing their distributed networks overnight. Instead, it will be a long and evolutionary process . . . but one with far reaching effects on both the computer and communications industries.

SPERRY UNIVAC TOPS OFF ITS PRODUCT LINE WITH THE 1100/80
ECL, BUFFER MEMORY, MULTIPROCESSING, LOWER MEMORY PRICES FEATURED

Sharing the marquee with DCA at the Sperry press conference this week was the new Sperry Univac 1100/80 large-scale computer. Although it had been long expected and discussed prior to announcement at security analyst gatherings, nevertheless it was still impressive as the largest Sperry computer and first of a series of even larger systems.

The system, predecessor of the 1100/YY and 1100/ZZ large-scale systems yet to be announced, will compete against low-end 370/168s and high-end 158s in performance, says Sperry, but at prices closer to the 158. In addition, the system offers multiprocessing across a 2x2 matrix of I/O processors and CPUs. Main memory runs from 524K 36-bit words (about 2 MB) to 4,194K words (over 16 MB), interfacing with the processing elements via a high-speed (125 ns cycle time) buffer memory of 8K words to 16K words.

EDP/IR notes the following interesting points about the new system, available for first customer deliveries in early 1977, on the opposite page:

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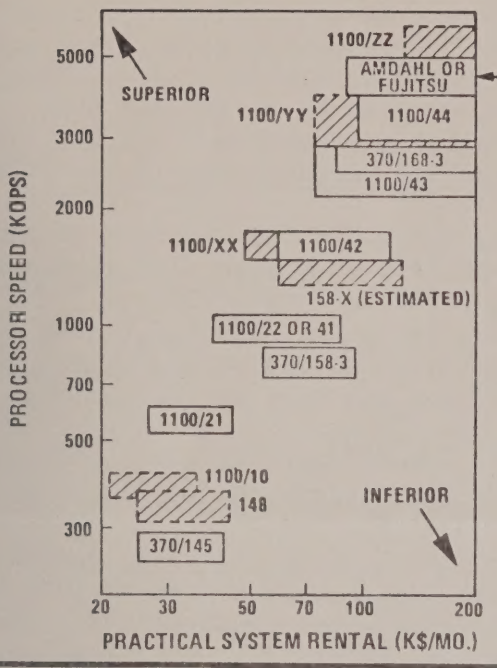
THE WORLD AS SPERRY SEES IT



Released by Sperry Univac at a security analyst's meeting in Blue Bell (PA) on September 15, 1976, the picture to the left illustrates Sperry's perception of the market -- present and future -- for its 1100 Series computers.

Of special interest are the "estimated" future systems, including an IBM 370/178 and upgraded 370/158 (which may have been the 158APS).

The 1100/80 announced on 11/10/76 is the planned 1100/XX; the 1100/YY is scheduled for release next year (Sperry FY 1978); the 1100/ZZ is scheduled for release in 1978 (late FY 78, early 79).

- The buffer memory and ECL circuitry not only provide faster, more efficient processing, but also serve notice that Sperry is as up-to-date in technology as any of them . . . important to the image of an IBM rival.

- The main memory -- or backing store as Sperry calls it -- is significantly lower priced than the memory on the 1100/40 and even slightly lower than the memory on IBM's 370/148 on a per-megabyte comparison.

- The price for a barebones CPU and minimum memory and buffer is $1.62 million purchased, $38,290 per month on a 1-year rental contract (25% less for 5-yr lease). For the biggest configuration -- 2 CPUs, 2 I/O processors, maximum memory -- the price is three times that.

- On the log-log scale of CPU & Memory price curves (EDP/IR,Oct.28,1976) the 1100/80s fall between the Itel AS/5-3 and AS/4MP at the low end and the IBM 370/158APS and Itel AS/5-3MP at the upper end.

- Attention has been paid to maintenance: A System Maintenance Unit (SIU) monitors system health and a 400 cycle motor alternator reduces the effect of power fluctuations. A System Transition Unit, connected to the CPUs, IOUs, and SIU, handles system control and unit assignment.

(Along with the 1100/80, Sperry introduced the 8434 Disk Storage Subsystem, for use with either 90/80 or 1100 series computers. Using 8434 disk drives of 307 megabytes or 54 million words, the subsystem can provide up to 4.9 billion bytes of disk storage for the 90/80, approximately 7.6 billion for 1100 computers.)

Coming six years to the day after the announcement of the 1110, the 1100/80, says Sperry Univac President G.G. Probst, is "another bold and decisive leap forward in advanced technology and systems architecture." And in this industry, at least, sometimes it takes such leaps just to keep up.

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POINT-OF-SALE NEWS SIGNALS UPSWING IN THE SUPERMARKET SECTOR AS IBM ANNOUNCES NEW PRODUCTS, DATA GENERAL AND SWEDA WED

Data General's predicament in the POS industry is significant -- it marks the closing of the door. There is no room for anybody new, at least not when it comes to full-blown, minicomputer-based system offerings. Users are simply not going to risk committing themselves to a supplier that might retreat from the industry and leave them with an Edsel . . . .
-- Autotransaction Industry Report, 10/8/76

The war is fought in the trenches, so they say, and while the Generals of Armonk were bedazzling the home front with SNA pyrotechnics, they were also making minor pops down the line . . . in this case with the 3660 Supermarket System. And while a new low-cost checkout scanner (IBM 3667) and a key entry controller enhancement (IBM 3663 Model 3) seem almost insignificant compared to whole rearrangements of network architecture . . . as SDLC devices they too are part of the action.

But an IBM announcement in supermarket POS merely caps the pattern of recent events which signal changes brewing in this nascent, still-growing-up industry:

- Data General gracefully changed its posture in the business by deeding its worldwide distribution rights for its supermarket system to Litton's Sweda International division (EDP/IR, Oct. 28, 1976). Sweda will add some of its own peripherals -- including scanners eventually -- to the line and buy $40 million of DG-made POS equipment between now and 1980.

- National Semiconductor has been cutting into NCR's monumental lead in supermarket POS, jumping nine points in market share in just 9 months.

- Scanning installations, stalled by controversy over removing item pricing, appear about to pick up speed. IBM leads this particular derby with 60% of all the scanning systems installed . . . but according to IDC estimates there are 36,000 supermarket POS terminals out there now, all of which are capable of supporting scanning.

U.S. SUPERMARKET POS TERMINAL INSTALLATIONS -- 9/30/76
(Copyright 1976 by International Data Corporation)

Vendors	# Installed (12/31/75)	% Market Share	# Installed (9/30/76)	% Market Share	% Δ in Base (1st 9 mo. 76)
NCR	13,200	60%	19,000	53%	44%
National Semi	3,000	14	8,000	23	167
Sweda	1,000	4	3,900	11	290
Bunker Ramo*	3,000	14	3,000	8	0
IBM	1,000	4	1,200	3	20
Univac	--	--	300	1	)
Data General	--	--	10	--	) 13
Others+	800°	4	590	1	)
TOTAL	22,000	100%	36,000	100%	64%

\+ MSI Data**, Pitney Bowes-Alpex**, etc.
** No longer manufacturing or marketing POS equipment
° This figure includes Univac and Data General as well as MSI, PB-A, etc.

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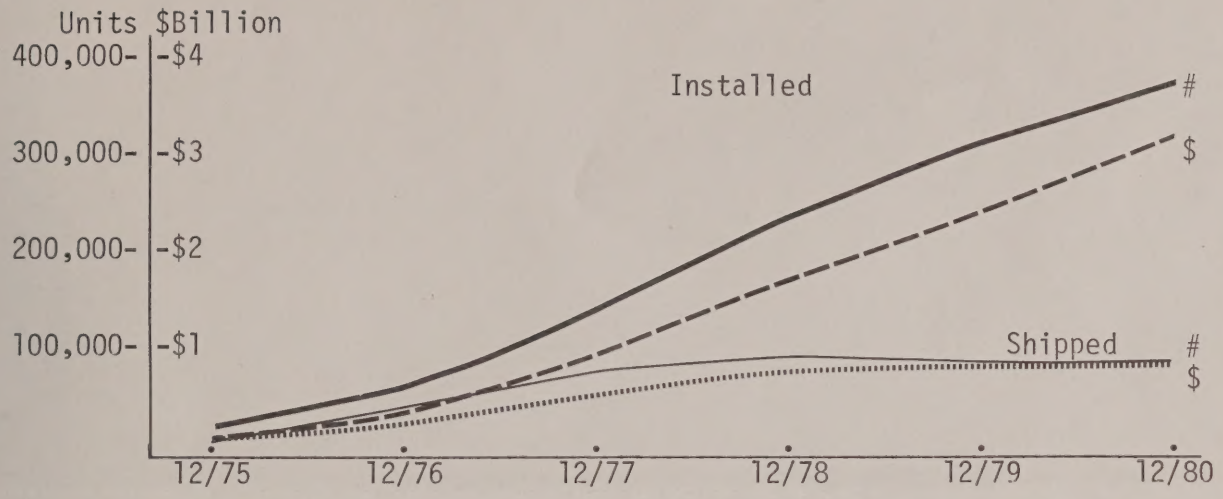
PROJECTED GROWTH OF U.S. SUPERMARKET POS TERMINALS
(Copyright 1976 by International Data Corporation)



Scanner Installations as of 9/30/76: IBM = 54, NCR = 14, National Semiconductor = 6, others = 16; Source: Super Market Institute.

- The price cut and configuration downgrade represented by the new IBM products should spur grocer interest in a product line that has heretofore been top-heavy . . . and unalluring to those users preferring to tiptoe into supermarket POS.

As a result of this activity, IDC estimates that 1977 supermarket POS terminal shipments will more than double this year's in value, surpassing those of the general retail sector for the first time. By early 1978 or so -- when UPC source-marking is presumably going hot-and-heavy -- supermarket POS terminals installed should pass the magic $1 billion mark.

Flying the scanner banner

Supermarketeers must generally justify their in-store systems on the basis of "hard" savings -- the "soft" savings of improved service are hard to quantify -- and probably the easiest to document are those from reduced back-room labor. But as the industry found out when it introduced the UPC and started to partake of those "hard savings," removal of item prices is unpopular. Add to that labor union fears for bundlers, checkers, and stock people . . . and a considerable bog appears in the path to full-scale POS systems.

So, for most vendors -- with one major exception -- the philosophy has been to wedge into the market at the low end with upgradable key entry systems, add a few scanning installations for show, and mark time until grocers and the public are ready for the switch to scanning. Meanwhile, the terminals in place can be upgraded when the time comes, and, as a backhand benefit to the slower pace in implementing UPC scanning, the scanning technology itself is improving all the time.

The major exception, of course, is IBM, which started building its product line from the top down and has emphasized scanning installations all along. It will be interesting to see how the systems-oriented mainframer fares against NCR's cash register prowess when the migration from straight hey entry begins en masse.

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• AND AS LONG AS YOU'RE NETWORKING, SAYS DATAPOINT, why not get a handle on your voice communications as well? Calling it INFOSWITCH, the San Antonio maker of processing terminals (terminal processors) has introduced a computer-based system for controlling and accounting for long-distance telephone usage. The system automatically selects the least-cost route -- WATS, Foreign Exchange, tie line, etc. -- for a long distance call. The system also records information on each call for budget purposes, thus supplementing a company's existing Centrex or PBX system. INFOSWITCH, says Datapoint, is targeted at companies spending $5,000 to $100,000 a month on communications charges and will be available early in 1977. A small INFOSWITCH configuration would cost less than $1,500 a month under lease.

• EVER HEARD OF A "FLIPPY DISK"? Read the Letters to the Editor in October's System/3 World and you'll learn how one user managed to take a one-sided diskette and, by carefully poking holes in it, turn it into a two-sided medium. And EDP/IR knows of at least one more user making home-grown "flippies." Media salesmen need not fear, however, as it's possible that the increased bookkeeping required to keep track of what's stored where isn't worth the price of another diskette.

• TIDYING UP ITS PRICE LISTS, HONEYWELL has upped the rental prices on selected computer equipment not affected by the company's rental price adjustments made in August. Monthly rental prices will be raised 4.5% on Series 60 Level 62 central systems and all central control units, nonstandard products, and selected peripherals for Keyplex equipment. A 7% increase will be levied on the System 700 and Datanet 700 CPUs and peripherals, 1640 CPUs and peripherals, and more.

• WHILE CDC WAS SCOOPING HEADLINES WITH ITS SALE TO THE CHINESE REDS, lesser-known Digital Resources Corporation of Houston, Texas, was pitching the People's Republic. The result was a $1.7 million contract for two "Prospector" seismic processing computer systems and associated "Respond" on-line interactive seismic software. Digital Resources' parent corporation is Applied Devices Corp.

• USING THE B 80 PROCESSING "ENGINE," the new Burroughs RT 5000 automatic teller systems "will perform a full range of financial services including electronic funds transfer at remote locations for banks, savings and loan associations, mutual savings banks and credit unions," says the Detroit mainframer. The console of the RT 5000 features a "customer guidance panel" to display messages and a keyboard with extra "yes" and "no" keys. The RT 5000 itself can dispense up to 4000 bills and is operated with magnetically encoded plastic cards. A transaction record printer in the RT 5000 creates a two-part form for each transaction: one for the customer, one for the bank. Initial deliveries will begin in 2Q 1977, and prices will range from $25,000 to $40,000 ($860 to $1,400 monthly lease rates).

• A FICHE DIET WAS TOO LEAN FOR SOME OF QUANTOR'S CUSTOMERS, so the company bought the rights to Memorex's 1603 COM printers and 1620 film duplicators and is offering the Memorex equipment as an option on its Q 115 COM unit. Memorex will still make the equipment and sell it to Quantor, who will market it as the Q 16.

• WHILE THE GIANT CLASHES ON TWO COASTS, OTHERS ARE GETTING INTO ANTITRUST: Computer Identics Corp. has filed suit against Southern Pacific for its alleged attempt to eliminate automatic car identification (ACI) or rail cars. The suit claims treble damages of $150 million. And Statistical Tabulating Corp. has filed suit against ADP, alleging ADP has tried to monopolize the market for batch processing of financial applications. Damages asked are $25M (x 3) and divestiture.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" DECEMBER 3, 1976 • VOL.12,NO.10 P.J.McGOVERN,PUBLISHER

Fight in Computers and Communications

FCC TEMPORARILY OKAYS DATASPEED 40/4 FOR INTERSTATE USE TERMINAL VENDORS AND CCIA FEAR INVESTOR/USER REACTION; CCIA TO SUE

In a decision that overruled its own staff and ran counter to a "straw" vote taken earlier this fall, the Federal Communications Commission last week gave the green light to AT&T's Teletype subsidiary to offer the Dataspeed 40/4 terminal on an interstate basis. The request for interstate tariff, initiated by AT&T a year ago, has been at the hub of a growing controversy over what constitutes a data communications terminal and what constitutes a data processing terminal . . . and, in its opposition, has made "strange bedfellows" of the Computer and Communications Industry Association (CCIA), the Computer Business Equipment Manufacturers Association (CBEMA), and giant IBM.

Because of the Dataspeed 40/4's editing features, buffer, and synchronous operation, the CCIA and CBEMA claim that it is an outright data processing device -- and thus outlawed under the 1956 AT&T vs U.S. consent decree. IBM contends that if AT&T is allowed to provide Dataspeed 40/4 service, it at least shouldn't come under federal regulation in doing so. AT&T, on the other hand, argues that the Dataspeed 40/4 is a data communications terminal -- like the Teletypes from which the company says it logically evolves -- and should be treated as such.

To settle the matter, the FCC has said it will expand the scope of its second Computer Inquiry -- opened this past August to reexamine and redefine the dividing line between computers and communications -- and specifically delve into the nature of the Dataspeed 40. But until then -- and over the objections of the commission's own Common Carrier Bureau -- AT&T's interstate tariff will be allowed. This second inquiry -- the first ran from 1966 to 1971 -- will be open to comments during the winter and is not expected to be completed until next fall.

Although the full text of the FCC's decision will not be available for several weeks -- and some affected parties, notably IBM, are reserving comment until then -- the reaction is expected to be quite vocal. The CCIA, for instance, which has opposed the tariffing of the Dataspeed 40 since the 40/1 was introduced, is so upset that it says it will file suit in the Washington, DC, U.S. Court of Appeals to stay the FCC decision. A spokesman for Sanders Corporation, which makes terminals with which the Dataspeed 40/4 competes, calls the decision a "grave error" and frets that the FCC announcement will cause "marketplace uncertainty."

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A MULTIMILLION DOLLAR MATTER OF SEMANTICS

In it's first Computer Inquiry, the FCC ruled that the computer industry should not be regulated and that regulated common carriers should stay out of it. But even then there was a question of where to draw the line between computers and communications. As a result, the FCC came up with the concept of "hybrid" services, and the use of computers in regulated communications offerings was approved provided such use was "incidental" to the service.

More recently the FCC proposed amendments to its original inquiry that would do away with the concept of "hybrid" services and provide a more specific definition of data processing. Under such a definition, DP would be considered "the use of a computer for the purpose of processing information wherein (a) the semantic content, or meaning, of input data is any way transformed, or (b) where the output data constitute a programmed response to input data."

But, does editing change the "semantic content" of the data? Does a microprogrammed microprocessor provide output data as a "programmed response to input data"? So . . . a new computer inquiry.

Meanwhile, the 40/4 joins the roster of IBM 3270 competitors -- a sector of the terminal market that hit the $1 billion mark in installed base this year and that should hit $2.5 before 1980 on the strength of the 250,000 editing CRT keyboard devices to be shipped in the next three years. No wonder there's a fuss.

There are certain aspects of the FCC decision that the CCIA and the terminal vendors find particularly galling:

- The FCC's preannouncement -- and the decision itself -- creates uncertainty for both users and investors . . . tempting the one to put off acquisition plans and the other to withhold capital from Bell competitors. Despite what the FCC says, the decision is likely to be interpreted as a signal that the ultimate decision will be pro-Bell.

- Although the Dataspeed/40 has been tariffed for intrastate use in over 20 states, such usage has been limited primarily to local terminal communication applications. An interstate tariff, however, opens the market for use in nationwide DP networks -- e.g., in the airline industry.

- The possibility of cross-subsidization, brought to light in the controversy clouding the "Bell Bill" (EDP/IR,May 28,1976), could give the Dataspeed 40 a competitive edge over equivalent equipment.

- Coming as it does while the FCC is under heavy attack by Bell System advocates in the "Bell Bill" controversy, the FCC decision hints of political considerations . . . and will permit AT&T to build a customer base from which to protest, should the second inquiry eventually rule against the Dataspeed 40/4 as a communications terminal.

Once the FCC decided that it would settle the Dataspeed 40 in the upcoming inquiry, it had two ways to go . . . and the fact that it chose to favor AT&T in the interim is significant. It's a minor victory for AT&T and one more obstacle for its competitors . . . who have had some severe setbacks this year as it is. One wonders if the FCC is aware of the old Arab proverb about the "camel's nose" . . . let it under the tent flaps and the rest of the camel is sure to follow.

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JAPANESE COMPUTER USERS PREPARE FOR INCREASED DATACOMM USAGE AS DIGITAL TELEPHONE NETWORK LAGS; TERMINAL SHIPMENTS GROW

While Japan boasts perhaps the second most sophisticated domestic computer industry in the world -- and a growing inclination to go up against U.S. mainframers for overseas business -- in data communications the country has its problems.

Although Japan's geographic area is much less than the U.S.'s, for instance, Japanese users lose about the same percentage of their DP budget to line charges as their U.S. counterparts. In fact, Japan's datacomm rates may be the highest in the computer-using world . . . and they're escalating at an alarming rate. In addition, despite the growing user approval of on-line computer use, the Japanese mainframers are behind U.S. firms in establishing coherent network architectures.

But in spite of these problems -- or perhaps because of them -- shipments of terminals and datacomm equipment to the Japanese marketplace are brisk. From the Japanese FY 1975 (ends March 31) to FY 1976:

- Shipments of remote-batch and intelligent terminals grew over 40% and 100% respectively (by dollar value) and shipments of other general-purpose terminals grew almost 30%.

- Application-unique terminal shipments -- about two-thirds of which were related to banking applications -- grew almost 30%. Especially impressive were the growth rates for POS and passenger reservations terminals.

- Shipments of data transmission equipment grew nearly 20% by value while those of "terminal control units" more than doubled.

TERMINAL AND DATACOMM EQUIPMENT SHIPMENTS TO THE JAPANESE MARKETPLACE

	Fiscal 1973		Fiscal 1974		Fiscal 1975		Fiscal 1976	
	Units	$(K)	Units	$(K)	Units	($K)	Units	$(K)
TERMINALS:								
Remote Batch	154	3,543	266	5,113	147	6,050	242	8,647
Intelligent	218	4,497	731	23,746	1,535	22,473	2,976	45,307
Other Gen-Purpose	9,043	38,843	2,496	27,750	14,381	71,837	18,167	91,060
Application-Unique								
POS					2,903	9,970	3,814	16,487
Medical Applc.					299	2,130	421	3,850
Banking & Stock Quote					17,851	199,827	18,289	234,163
Pass. Reservations					745	5,750	1,068	10,050
Other (All:73&4)	18,888	140,467	9,888	102,987	7,282	37,277	8,562	47,283
Other Terminals	4,380	12,900	1,633	16,753	2,521	20,790	3,261	27,980
TOTAL TERMINALS	32,683	200,250	15,014	176,349	47,664	376,104	56,800	484,827
DATA TRANSMISSION:								
Modems	16,162	14,870	14,356	12,600	21,562	21,730	25,691	27,560
Accoustic Couplers	37	13	474	543	2,148	650	2,280	876
Other	3,625	16,030	4,072	13,050	791	26,460	1,327	29,273
Terminal Controllers					1,588	16,366	1,820	39,533
TOTAL TRANSMISSION	19,824	30,913	18,902	26,193	26,089	65,206	31,118	97,242

(Source: Japan Electronic Industries Development Association; reprinted from EDP JAPAN REPORT)

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Catching up

In hopes of alleviating the datacomm bottleneck for network users, Nippon Telegraph and Telephone (NTT) has proposed a digital transmission service, called the Dendenkosha Data Exchange (DDX), which it hopes to have ready for practical use by the spring of 1978. The DDX net will mark the culmination of experiments begun in 1971 . . . and will be supported in part by government monies.

But within just the last six months, NTT has proposed revisions to the network, and expected backlash from users could make for even more change before DDX is reality. As of now, the status of the network is as follows:

+ NTT is easing toward adoption of the X-25 packet-switching interface for use with DDX; once this occurs, terminal vendors are expected to design their offerings in accordance with the standard.

+ Perhaps because of software and design complexities, NTT has switched from planning a hybrid digital/packet network to a "split" type network which offers both methods. As it stands, however, users could not use both services with the same terminal.

+ As a result of the network design changes, DDX is lagging behind its schedule . . . and controversy surrounding the decision to offer "split" service could exacerbate matters.

Despite the current hang-ups, NTT has follow-on enhancement plans. These include shifting control of the packet-multiplexor from the carrier to the user and the addition of added function to the packet service. In the latter case, NTT could well follow the lead of AT&T's Transaction Network.

Meanwhile, the Japanese mainframers are working on their network architectures . . . with Fujitsu (of Amdahl fame) being considered the most advanced, having already announced a "Fujitsu Network Architecture." In contrast, Japan's other big computer manufacturer, Hitachi, seems to be pursuing an overall networking commitment less aggressively.

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DEC EXPANDS TOP AND BOTTOM OF ITS COMMERCIALLY-ORIENTED LINES; ADDS DECSYSTEMS 1090 AND 2040, DEC DATASYSTEM 320 MODELS

In unrelated announcements, Digital Equipment recently added more punch to both ends of the commercially-oriented side of its product line . . . this while the industry was still abuzz over IBM's intrusion into traditional DEC provinces.

In the first announcement, the company sculpted a new top for its System-10 line with the DECsystem 1090 (and dual-processor 1099), which DEC says is more powerful but less costly than its 1080 predecessor . . . and comparable in performance to the IBM 370/148 and 158. Prices for the new system -- which comes with 256 to 4 million 36-bit words of memory -- start at $700,000. Behind the enhanced performance of the 1090, says DEC, is a new CPU (the KL10B), a new memory system, a new synchronous/asynchronous front end, and new disk drives.

Along with the 1090, but not so high on the product line, DEC announced the DECSYSTEM 2050, a bigger version of the 2040 announced last winter (EDP/IR, Jan.15, 1976). The 2050, says DEC, can accommodate up to 128 timesharing users -- while batch operations are still going on -- and comes with some potent high-level soft-

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ware, including a CODASYL-compatible Data Base Management System. Like the 2040, the 2050 is supported by the TOPS-20 operating system, the control program based on software used with the ARPANET. According to DEC, the 2050 -- with prices that start at $500,000 -- offers over twice the performance of the 2040 for only 25% more. The greater performance of the 2050 over the 2040, says DEC, results primarily from a new cache memory and the ability to use higher-speed peripherals. The memory on the 2050 is expandable from 256K 36-bit words to twice that.

Less than a week after the 1090/2050 announcement, DEC reached around to the other end of its product line and introduced the DEC DATASYSTEM 320, a new entry level series for the Datasytem line (Datasystem 350, 500)。 Based on DEC's LSI-11 microprocessor, the 320 currently comes in two flavors: one with floppy disk for mass storage, one with hard disk. Both models come with 32KB of memory, a terminal, and a matrix printer. Both can expand to 56KB of memory, and both can add up to 19.2MB of disk. The small model is priced just under $21,000; the larger model is priced at $34,000. The 320s come with full software support and are scheduled for first customer deliveries in late spring of 1977.

So, once more a traditional maker of minicomputer "iron" has added strength to its product line in ways especially beneficial to commercial use. The upgraded performance of the 1090/2050 will allow timesharing users to run concurrent batch all the more easily, the high-level software and DBMS system enhances possibilities for business use . . . the Datasystem 320 brings easy-to-use computer power to yet another stratum of the small business world. In light of the recent acknowledgement by IBM of DEC's traditional minicomputer realm . . . a few more rivets in the armor plate on that side are probably not a bad idea.

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A WORD ABOUT THE GROUP A COMPUTER CENSUS

IDC's General-Purpose (Group A) Computer Census for Mid-1976 (see pages 6&7) represents the first step in a reassessment of this device for measuring the marketplace. Once other steps are complete and published in the 1977 issue of the Review and Forecast, IDC expects to have additional data on small business computers and to publish a more complete census of this important sector. For the census presented here, however, the historical format has been followed.

In preparing this Census for presentation, IDC researchers worked with several of the mainframe manufacturers in establishing checkpoints between vendor installed base records and IDC's data file of computer installations. IDC also reevaluated average values for the models listed in the Group A Census. Thanks to this effort and enhanced techniques of data file analysis, the mid-year 1976 census represents IDC's best current estimate of the installed base of General-Purpose computers made by U.S. manufacturers.

But note that since each census is IDC's best estimate of the real world at a particular point in time, figures may not correspond exactly to those published previously. Thus, extreme caution should be exercised if comparisons are made between this and prior listings. Attempts to extract from consecutive censuses a figure for net add or shipments can produce misleading results.

Estimates of shipments, etc., will be made in the annual Review and Forecast issue of EDP Industry Report. Meanwhile, comments from readers are welcome; please address them to the Census Editor at the address displayed on the front of the newsletter.

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GENERAL PURPOSE COMPUTER CENSUS

Counts in the General-Purpose Digital Computer (Group A) Census shown below are based on the best information available to IDC -- but are definitely estimates. Computer makers, as a rule, do not directly supply this type of data. Only through the use of IDC's extensive data files and other sources are estimates such as these possible. The computers included in Group A comprise the bulk of digital computers (by value) in operation. They are byte or character oriented -- except for large-scale scientific computers that have large words -- and are primarily programmed in higher-level languages. In addition to this Census, EDP/IR publishes a Dedicated Application Digital Computer (Group B) Census that includes minicomputers and special-purpose machines.

Computer size classes are based on the IBM 370 product line -- rather than constantly shifting average system values -- and which of a manufacturer's models competes with which IBM machine. For example, a vendor's computer in Size Class 7 would more closely compete with an IBM 370/168 or 165 than any other IBM computer. Other classes can be readily checked under IBM's column.

AS OF JULY 1, 1976

NAME OF MANUFACTURER	COMPUTER MODEL	CLASS	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Amdahl	470V/6	7	$105,000	6/75	11	2	13	20
Burroughs	B-80	1	$ 1,600	11/76	0	0	0	3,300
	B-200	3	$ 5,600	11/61	]	]	]	X
	B-300	3	$ 5,500	7/65	] 550	] 385	] 935	X
	B-500	3	$ 6,600	11/68	]	]	]	X
	B-70X/71X	2	$ 1,350	3/73	] 1,200	] 700	] 1,900	] 2,000
	B-72X/73X	2	$ 2,000	4/75	]	]	]	]
	B-1712/14/16/18	2	$ 2,400	8/72	] 930	] 600	] 1,530	] 300
	B-1710 Series	2	$ 2,400	12/75	]	]	]	]
	B-1776/26/28	3	$ 6,700	2/73	280	140	420	200
	B-2500	4	$ 9,300	2/67	89	100	189	X
	B-2700	4	$ 9,100	8/72	335	155	490	X
	B-2800	4	$ 15,000	12/76	0	0	0	50
	B-3500	4	$ 16,800	5/67	450	345	795	X
	B+3700	4	$ 23,500	11/72	260	190	450	100
	B-3800	4	$ 19,000	12/76	0	0	0	50
	B-45/4700	5	$ 28,500	10/71	] 295	] 120	] 415	] 75
	B-4790	5	$ 41,000	11/75	]	]	]	]
	B-4800	5	$ 41,500	9/76	0	0	0	40
	B-5500	5	$ 35,000	3/63	] 72	] 28	] 100	X
	B-5700	5	$ 30,500	12/70	]	]	]	X
	B-6700	6	$ 60,500	11/69	112	88	200	] 90
	B-6800	5	$ 46,500	1/77	0	0	0	]
	B-7700	7	$127,000	8/73	16	3	19	20
	Total				4,589	2,854	7,443	6,225
Control Data Corp.	G-20	4	$ 19,600	4/61	3	2	5	X
	1604/A/B	6	$ 42,000	1/60	10	1	11	X
	31/3150	4	$ 9,800	12/64	54	31	85	X
	3170	5	$ 20,500	12/70	13	14	27	X
	3200	4	$ 14,700	5/64	37	29	66	X
	3300	5	$ 31,500	9/65	89	74	163	X
	3400	5	$ 23,700	11/64	3	4	7	X
	3500	5	$ 28,000	1/69	19	16	35	X
	3600	6	$ 49,000	6/63	15	16	31	X
	3800	6	$ 55,000	12/65	14	3	17	X
	6200	6	$ 40,500	11/70	0	8	8	X
	Cyber-72	5	$ 38,000	10/71	27	77	104	] 20
	Cyber-172	6	$ 44,000	7/75	4	33	37	]
	6400	6	$ 56,000	5/66	54	49	103	X
	Cyber-73	6	$ 54,000	3/72	28	42	70	] 15
	Cyber-173	6	$ 72,000	9/75	2	13	15	]
	6500	6	$ 79,500	12/67	17	16	33	X
	6600	7	$120,000	8/64	54	34	88	X
	Cyber-74	7	$121,000	3/72	10	5	15	X
	Cyber-174	6	$ 83,500	9/75	0	1	1	]
	Cyber-175	7	$145,000	8/75	2	2	4	] 5
	Cyber-76	7	$171,000	3/72	3	8	11	]
	7600	7	$178,000	1/69	22	9	31	X
	6700	7	$130,000	7/70	2	0	2	X
	Star-100	7	$260,000	12/74	4	0	4	X
	Total				486	487	973	40
Digital Equipment Corp.	2040	3	$ 8,000	6/76	1	0	1	20
	PDP-6	4	$ 10,000	10/64	7	4	11	X
	1040/50/55	4	$ 15,500	10/67	195	155	350	X
	1060/70/77	5	$ 32,000	6/72	85	75	160	] 50
	1080/88/90	6	$ 40,000	6/75	20	10	30	]
	Total				308	244	552	70
HIS	Gamma 10	2	$ 2,500	7/64	0	870	870	X
	Gamma 30	4	$ 10,000	2/62	0	85	85	X
	G-5X Series	2	$ 1,700	8/70	325	1,670	1,995	X
	G-100 Series	3	$ 4,500	4/66	110	950	1,060	X
	G-200 Series	4	$ 10,000	4/61	125	31	156	X
	G-400 Series	4	$ 16,000	5/64	220	260	480	X
	G-615/25/35/45	6	$ 74,000	4/65	49	36	85	X
	G-6025	5	$ 29,500	11/73	32	35	67	X
	G-6030/40	5	$ 39,000	6/71	63	130	193	X
	G-6050/60	6	$ 63,500	7/71	110	56	166	X
	G-6070/80	6	$100,000	7/71	42	21	63	X
	G-6180	7	$101,000	2/74	3	0	3	X
	G-Subtotal				1,079	4,144	5,223	X
	H-105/115	3	$ 6,000	3/70	435	400	835	X
	H-110/120	3	$ 5,000	1/66	175	155	330	X
	H-125	4	$ 8,100	12/67	29	185	214	X
	H-200	3	$ 7,500	3/64	320	155	475	X
	H-2020	3	$ 3,500	2/73	590	130	720	X
	H-2030	3	$ 5,500	1/73	145	53	198	X
	H-2040	4	$ 12,000	4/72	300	140	440	X
	H-1015	4	$ 13,700	4/71	34	35	69	X
	H-2050	4	$ 18,000	4/72	140	96	236	X
	H-12/1250	4	$ 13,700	2/66	260	105	365	X
	H-2015	4	$ 20,000	2/71	46	34	80	X
	H-2060	4	$ 19,000	4/72	52	21	73	X
	H-2200	4	$ 18,500	1/66	110	37	147	X
	H-2070	5	$ 32,000	5/72	44	3	47	X
	H-3200	5	$ 26,500	2/70	100	30	130	X
	H-4200	5	$ 43,000	9/68	19	2	21	X
	H-8200	6	$ 70,000	2/69	14	5	19	X
	H-4/1400	4	$ 14,000	12/61	15	17	32	X
	H-8/1800	5	$ 35,000	12/60	21	13	34	X
	H-Subtotal				2,849	1,616	4,465	X
	Series 60: 61/58	2	$ 2,050	6/74	64	490	554	] 400
	61/60	2	$ 3,000	6/74	43	440	483	]
	62/40	3	$ 4,000	10/74	85	61	146	] 300
	62/60	3	$ 5,100	10/74	42	117	159	]
	64/20	4	$ 8,800	10/74	55	200	255	] 200
	64/40	4	$ 12,500	10/74	5	48	53	]
	66/10	5	$ 25,000	6/75	20	22	42	]
	66/20	5	$ 35,000	11/74	58	88	146	] 75
	66/40	6	$ 57,500	10/74	18	31	49	]
	66/60	6	$ 83,000	10/74	23	10	33	]
	66/80	7	$102,000	10/74	7	3	10	] 5
	68/80	7	$ 93,000	10/74	2	0	2	]
	Series 60 Subtotal				422	1,510	1,932	980
	HIS Total				4,350	7,270	11,620	980

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AS OF JULY 1, 1976

NAME OF MANUFACTURER	COMPUTER MODEL	CLASS	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
IBM	System/32	1	$ 900	3/75	5,000	1,200	6,200	10,000
	System/3-4	2	$ 1,200	6/76	60	10	70	500
	System/3-6	2	$ 1,600	12/70	2,200	1,500	3,700	X
	System/3-8	2	$ 2,000	6/75	3,000	2,250	5,250	3,000
	System/3-10	2	$ 2,400	1/70	13,900	7,800	21,700	X
	System/3-12	3	$ 3,500	3/76	860	80	940	3,000
	System/3-15	3	$ 6,100	3/74	2,600	1,000	3,600	800
	Subtotal				27,620	13,840	41,460	17,300
	370/115	3	$ 8,000	4/74	1,400	2,300	3,700	300
	370/125	4	$ 11,300	6/73	1,320	2,080	3,400	100
	370/135	4	$ 18,000	5/72	2,550	2,800	5,350	X
	370/138	4	$ 19,500	11/76	0	0	0	2,250
	370/145	5	$ 34,000	7/71	1,820	1,670	3,490	X
	370/148	5	$ 35,500	2/77	0	0	0	1,500
	370/155	6	$ 63,000	2/71	550	450	1,000	X
	370/158	6	$ 79,000	5/73	1,150	1,000	2,150	425
	370/165	7	$117,000	6/71	115	69	184	X
	370/168	7	$134,000	7/73	335	215	550	90
	370/195	7	$245,000	3/71	13	4	17	X
	Subtotal				9,253	10,588	19,841	4,665
	360/20	3	$ 2,700	12/65	1,600	3,400	5,000	X
	360/22	3	$ 3,400	7/71	225	225	450	X
	360/25	3	$ 7,700	10/68	185	830	1,015	X
	360/30	4	$ 10,300	6/65	2,160	1,530	3,690	X
	360/44	4	$ 17,000	7/66	45	54	99	X
	360/40	4	$ 17,500	6/65	1,200	1,350	2,550	X
	360/50	5	$ 31,000	8/65	550	410	960	X
	360/65	6	$ 66,000	11/65	410	215	625	X
	360/67	7	$135,000	6/66	28	16	44	X
	360/75	7	$113,000	1/66	26	16	42	X
	360/85	7	$170,000	10/69	3	1	4	X
	360/9X	7	$181,000	11/67	12	4	16	X
	Subtotal				6,444	8,051	14,495	X
	1130	2	$ 2,400	2/66	1,800	1,550	3,350	X
	1401	3	$ 3,700	9/60	630	750	1,380	X
	1401-G	2	$ 2,400	5/64	22	14	36	X
	1401-H	2	$ 1,700	6/67	5	16	21	X
	1410	4	$ 17,000	11/61	52	39	91	X
	1440	3	$ 4,700	4/63	97	155	252	X
	1460	4	$ 10,000	10/63	19	23	42	X
	1620	3	$ 2,700	9/60	140	125	265	X
	7010	5	$ 25,500	10/63	6	5	11	X
	7030	7	$160,000	5/61	2	1	3	X
	704/705	5	$ 37,000	1/56	1	3	4	X
	7040/44	5	$ 30,000	6/63	13	21	34	X
	7070/74	5	$ 27,000	3/60	97	26	123	X
	7080	6	$ 60,000	8/61	32	0	32	X
	7090/94	6	$ 71,000	8/60	42	10	52	X
	Subtotal				2,958	2,738	5,696	X
	IBM Total				46,275	35,217	81,492	21,965
NCR	8200	1	$ 1,700	9/75	330	370	700	700
	Century-50	2	$ 2,050	2/71	740	40	780	X
	Century-75	2	$ 2,000	7/76	0	0	0	10
	Century-100	3	$ 2,980	9/68	485	750	1,235	X
	Century-101	3	$ 3,650	10/72	1,245	680	1,925	X
	Century-151	3	$ 4,500	2/75	220	55	275	X
	Century-200	4	$ 7,000	9/69	380	430	810	X
	Century-201	4	$ 10,000	8/74	245	105	350	X
	Century-251	4	$ 17,750	11/73	80	65	145	] 40
	Century-300	5	$ 22,600	2/72	70	75	145	]
	Criterion-8550	3	$ 9,200	4/76	6	4	10	300
	Criterion-8570	4	$ 14,500	5/76	3	0	3	250
	315	3	$ 3,350	5/62	115	170	285	X
	315-RMC	4	$ 9,550	9/65	20	20	40	X
	Total				3,939	2,764	6,703	1,300
Singer	System 10	2	$ 2,400	10/70	1,860	1,300	3,160	X
Sperry Univac	III	4	$ 27,000	8/62	87	33	120	X
	SS-80/90	3	$ 8,500	8/58	2	6	8	X
	418 I/II	4	$ 12,000	6/63	52	65	117	X
	418 III	4	$ 40,500	6/69	46	89	135	X
	491/492	5	$ 28,500	12/61	7	3	10	X
	494	6	$ 79,000	2/66	66	58	124	X
	1004	2	$ 1,100	2/63	340	380	720	X
	1005	2	$ 1,800	4/66	280	95	375	X
	1050	3	$ 9,300	9/63	135	94	229	X
	1106	6	$ 43,000	12/69	90	220	310	X
	1107	6	$ 60,000	10/62	4	10	14	X
	1108	7	$ 83,000	9/65	160	98	258	X
	1110	7	$133,000	6/72	53	72	125	10
	9200	2	$ 2,200	6/67	765	775	1,540	X
	9300	3	$ 4,800	9/67	625	525	1,150	X
	9400	4	] $ 11,500	5/69	] 245	] 445	] 690	X
	9480	4	]	3/73	]	]	]	X
	90/30	4	$ 5,400	2/75	260	430	690	650
	90/60	5	$ 18,700	1/74	60	65	125	20
	90/70	5	] $ 23,000	11/73	] 10	] 30	] 40	20
	9700	5	]	8/72	]	]	]	X
	90/80	5	$ 55,500	11/76	0	0	0	30
	1100/10	5	$ 31,000	4/76	5	0	5	70
	1100/20	6	$ 28,500	4/75	5	19	24	20
	1100/40	7	$ 71,500	7/75	4	16	20	20
	Subtotal				3,301	3,528	6,829	840
	301	4	$ 6,900	10/60	54	5	59	X
	501	5	$ 16,500	6/59	6	0	6	X
	3301	5	$ 23,500	7/64	48	0	48	X
	Spectra 70/15	3	$ 4,250	9/65	6	0	6	X
	Spectra 70/25	3	$ 7,500	9/65	1	1	2	X
	Spectra 70/35	4	$ 13,200	1/67	68	2	70	X
	Spectra 70/45	5	$ 24,500	11/65	205	11	216	X
	Spectra 70/46	5	$ 41,000	11/68	37	1	38	X
	Spectra 70/55	5	$ 39,000	11/68	6	0	6	X
	Spectra 70/60	6	$ 45,500	9/70	23	0	23	X
	Spectra 70/61	6	$ 50,500	3/71	6	0	6	X
	Spectra 1600	3	$ 3,800	1/69	34	0	34	X
	Spectra 70/2	4	$ 12,700	7/71	48	0	48	X
	Spectra 70/3	4	$ 20,500	10/71	17	0	17	X
	Spectra 70/6	6	$ 33,000	10/71	41	2	43	X
	Spectra 70/7	6	$ 40,000	10/71	24	0	24	X
	Subtotal				624	22	646	X
	Total				3,925	3,550	7,475	840
Xerox	Sigma-5	4	$ 13,500	8/67	235	34	269	X
	Sigma-6	4	$ 21,000	11/70	38	12	50	X
	Sigma-7	5	$ 25,500	12/66	83	10	93	X
	Sigma-8	4	$ 19,700	9/71	10	7	17	X
	Sigma-9	6	$ 47,000	11/71	49	21	70	X
	530	3	$ 3,600	8/73	225	44	269	X
	550/560	4	$ 12,700	11/74	69	5	74	X
	940	5	$ 25,000	4/66	49	4	53	X
	9300	3	$ 8,500	11/64	18	4	22	X
	Total				776	141	917	X
TOTAL					66,519	53,829	120,348	31,440

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• AMIDST THE DIN OF NETWORKING ANNOUNCEMENTS (EDP/IR,Nov.12,1976), third-party computer lessor DPF came up with its own solution -- "Flexicom." Configured using IBM 360 or 370 hardware as nodal processors or front-end controllers and an enhanced version of the telecommunications monitor, "Taskmaster," Flexicom offers IBM users a turnkey solution to network systems consistency problems, says DPF. To be available in the second quarter of 1977 -- long before IBM's networking SNA software is available -- a Flexicom minimum system could cost less than $6,000 a month on a three-year lease, says DPF.

• HOPING TO ENTICE EVEN MORE COMMERCIAL DBMS USERS, Rapidata has announced major reductions in the cost of its data base storage prices and says it "now provides one of the lowest data base storage pricings available from the major timesharing vendors." The cost of storing nonexecutable data accessible through Rapidata's DBMS-10 will be reduced 50%; other storage discounts will range from 10% to 50%. The company feels that the price cuts will strengthen its position in the commercial data base market . . . one of the fastest growing segments of remote computer services (EDP/IR,Oct.18,1976).

• OILING THE COMPETITIVE MECHANISM, THE GSA recently signed teleprocessing service contracts for $4 and $5 million with Computer Network Corporation (COMNET) and First Data Corporation. The GSA expects to add contracts with other services vendors for a total in the vicinity of $80 million. The contract schedules will replace a single contract the GSA had with Computer Sciences' Infonet Division for nearly four years. Under the contract scheduling system -- which is to work for services like current hardware schedules -- federal agencies will be able to order computer services from the GSA contract, rather than go out on separate procurement. The expansion of contract scheduling to teleprocessing services comes in the wake of a Budget Office directive that agencies must use outside computer services wherever necessary to fill expanding requirements.

And under the new setup, COMNET has snared a $20 million contract from the Environmental Protection Agency -- beating out Boeing Computer Services -- and in the process has about doubled its current revenue base. The EPA contract calls for COMNET to provide a dedicated 370/168, 16 billion bytes of high-speed data storage, and COMNET's proprietary remote computing software system, ALPHA. Says COMNET, its services will support "one of the largest data bases within the Federal Government."

• BURROUGHS HAS NEW AUDIT ENTRY SYSTEMS AND A NEW AUDIT ENTRY LANGUAGE, namely the AE 400 family of "Audit Entry Data Preparation" system and the AEL language. Also announced were new models of the AE 500 family. The basic AE 412, says the company, incorporates a standard Burroughs keyboard, separate 10-key pad, special function keys, 16 program select keys, a 60 cps printer, 240 character display panel, 243KB minidisk drive, and a powerful microprogrammed processor. The AE 422 is a nonprinting version of the 412; the new 500 models are similar to the 412 except for data storage media. The basic AE 412 can be purchased for $9,150 and will lease for $335 a month.

• DATRAN'S COLLAPSE IS STILL RESOUNDING: Wyly Corporation has reported a nine-month loss of $70 million, $65 million of which it attributes to Datran's demise.

• HELPING THE JAPANESE MIGRATION TO ON-LINE SYSTEMS will be two 1100/40 blockbusters from Sperry Univac worth $15 million. One, an 1100/41 will go to Daihyaka Mutual in Tokyo, the other, a 1100/42 to Fukoku Mutual in Fukoku, Kyushu.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" DECEMBER 15, 1976 • VOL.12,NO.11 P.J.McGOVERN,PUBLISHER

Inside: First cut at 1977 user spending

USERS, VENDORS, ANALYSTS CONFER ON DISTRIBUTED PROCESSING . . . MANAGEMENT AND CONTROL FOUND MORE IMPORTANT THAN TECHNOLOGY AND ECONOMICS

> I should say at the outset that I favor decentralization as a general principle -- but I think it will work only if it does not conflict with the overall management philosophy and mores of the enterprise . . . .
>
> Now, we've been hawking the joys of computerdom with almost religious fervor for years, while at the same time making it more and more difficult for all but the most tenacious of our users to experience those joys. Perhaps we can now fall back on the reasonably honorable objective of providing better service to our users -- even if it means our priesthood becomes somewhat contaminated in the process . . . .
>
> I think there's some good news available coming out of the distributed data processing movement. I think it's entirely possible that the quality of service rendered to the enterprise and to the individuals in the enterprise could improve . . . the bad news is that there's a great deal more to distributing data processing than selecting the right hardware and software and designing the network. The technical problems are challenging enough, but they are only the tip of the iceberg . . . .
>
> -- George Glaser, past AFIPS president
> IDC conference on DDP, 12/6/76

While users were pasting the final corrections onto their 1977 EDP budgets (story on page 4), about three hundred executives from both user and vendor organizations gathered last week at South Carolina's famed Hilton Head resort area and talked with analysts from IDC and elsewhere about the much-discussed -- and variously defined -- topic of "distributed data processing."

In that secluded and blustery oceanfront setting, some basic traits of the elusive subject began to emerge. For users they arose as key issues in the implementation of DDP; for vendors they popped up as the caveats and user expectations they must keep in mind in catering to the market; and for analysts they came as points that must be considered to understand the real world. In many cases they were of the nature of the issues raised above by George Glaser . . . issues of management and control more than technology or even (measurable) economics.

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A CASE STUDY: BANK OF AMERICA

With a rapidly growing stable of branch banks -- over a thousand in 1976 and growing at the rate of 20-30 a year -- and 7 million checking and savings accaccounts, customer account inquiry at the Bank of America was putting a strain on its batch system. Data processing, including daily update and printout of account status reports for the branch banks, took place at two data centers -- each processing 3 million entries a day that affected the status of customer accounts. From a teller's point of view, especially in light of the increasing diversity of banking services, account inquiry by means of a manual check of a computer printout was often less satisfactory than the old ledger card system.

So, in 1970 the bank began testing teller terminals and by 1974 had management approval for a 100-branch pilot test of an on-line account inquiry system. As a result of that pilot test and in line with the company's goals of: 1) cutting check cashing losses 33%, 2) reducing office phone expenses 40%, 3) cutting office staff 16%, and 4) eliminating the daily status reports . . . a system was designed. It was a distributed processing system. As envisioned:

- Each branch would contain on-line teller and administrative terminals wired to a programmable controller . . . the teller terminals handling account inquiry, the others data capture on new and changed accounts.

- Each data center would divide its large customer account data base among a series of interconnected processing modules . . . each consisting of two message-switching minicomputers and two file handling minicomputers. Each center would also have a technical control facility for monitoring external communications lines.

- Each processing module would support a number of branch banks, returning a yes/no to the interrogating branch when an account is queried and flagging that account as one with a transaction in the pipeline that will affect its balance.

- The actual account status would be updated nightly through the normal batch process -- neither the public nor the bank is ready for on-line transaction posting -- and the processing module data bases updated by disk pack transfers from the centers' master IBM 370s.

According to the plan, the final system will support 7700 teller terminals, 1300 administrative terminals, and 1120 programmable controllers. Although the processing modules are all housed in the data centers, it's not a functional requirement and the possibility of future geographic distribution exists. The capital expenditure for equipment, says the bank, is projected to save $13 million through 1975-78 . . . and cut 40%-50% from applications development R&D costs. The total system will cost $30.6 million (about half in branch office equipment) . . . but once the system is operational, the bank anticipates that benefits will exceed costs by about $3 million a year.

Future applications -- which the bank considers will cost significantly less than the initial ones -- will center on bank card applications . . . first with account inquiry, later with source data capture at the point-of-sale. Perhaps by the early 1980s the bank will add source data capture for savings accounts and demand deposits. On-line check cashing, however, is not foreseen as a future application. Not this round, anyway.

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Some of the key points raised by conference attendees and speakers:

- DDP is technology-related only in that it's now easier to map an information system onto an organization's information needs. Once a decision is made to implement an application (a big once!) an algorithm can be established to determine the actual network setup.

- Thus, users are implementing DDP on an application-by-application basis. And often the decision to implement DDP is the result of efforts from a single, adventuresome individual in the organization.

- Also, users are implementing DDP networks primarily for new applications. Central site hardware is generally unaffected . . . although the desire to avoid a central site upgrade can be a motivating factor.

- The more technology makes the decentralization of information systems possible, the more management is forced to decide basic questions of control. The desire to give local managers more autonomy can often override strict cost analyses based only on "hard" savings.

- For the industry, the spread of DDP systems means potential for "new" EDP dollars -- spending that comes out of line operating budgets instead of the traditional staff monies.

- As DDP systems progress, network management looms as a possible technical headache most DP managers are unaccustomed to dealing with. Opportunity may exist here for today's computer service firms.

But far and away, the matter voiced of most concern by conference attendees was that of control. Where should the responsibility for DDP decisions lie? Who should do the programming? Who evaluates the success or failure of a project? How far down the line should hardware acquisition decisions be placed? Are many local data files -- each more vulnerable than a central data file -- safer than a single large file with less chance of violation but greater consequences if security is breached? How much change can an organization dictate to its line units -- and how much must come from within?

These and others are the questions management must ask of itself when it considers taking advantage of distributed data processing. And the fact that the answers are not easy to come by determines another characteristic of distributed data processing . . . its acceptance will not come overnight.

DDP, the pace of change, and the 80-20 rule

In its user research on DDP acceptance presented at the Hilton Head conference, IDC first looked at the nature of DDP itself. For most of its analysis, IDC looked at that version of distributed processing where a local data base (either generated locally or culled from a central base) is present. Further, the company considered that a distributed processing system would have three basic elements: 1) a network of processing nodes functionally or geographically distributed and connected via communications linkage, 2) each node storing and accessing its part of a common data base, and 3) central control of system development and hardware and software acquisition. In other words, distributed data processing implies a system . . . where the interrelated parts provide a whole that is greater than their sum. Thus, "distributed" is different from "decentralized."

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IDC traces the evolution of DDP from the standalone systems of the 1960s and their financial applications emphasis . . . through the centralization phase of the early 1970s and the order entry/inventory control applications of large data bases . . . to the implementation of transaction-driven applications suitable for DDP. But in following the trend, IDC finds that users are not turning to "distributed processing" at a breakneck pace. There are reasons for this:

+ DDP requires financial commitment. Besides equipment costs, there are significant training and support costs in distributing DP power and responsibility to line operations. Thus DDP generally manifests itself in pilot projects first -- which can take years to complete. (Many a DDP project has been justified more than once to jittery management.)

+ DDP also requires emotional commitment. Leaving the IBM fold to experiment with minis is no easy decision for some companies; and distributing DP power to his line counterparts is not always the easiest thing for a DP manager to accept.

+ Not all applications are suited to DDP. In general an "80-20" rule applies . . . DDP makes economic sense if 80% of the data generated at a downline site is useful only to that site.

As a result, DDP has yet to become a "fad" . . . and few vendors of DDP products have yet to see significant revenues attributable to "distributed data processing" systems. But the impetus is there, the groundwork is being laid. Industry by industry, leading-edge users are taking the first step . . . and judging from the podium messages, workshop discussions, and plain old mealtime discourse at Hilton Head last week, that first step is not likely to be the last.

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Preliminary spending survey

USERS INDICATE MORE "REAL" SPENDING IN THE CARDS FOR 1977
AS EQUIPMENT WORKLOADS STRETCH AND SPUR ACQUISITIONS

Bucking the recent signs of sluggish spending in other capital goods areas, users polled in IDC's annual user spending survey indicate that spending on EDP goods and services for 1977 should jump 11% over 1976 . . . promising another banner year for the industry's suppliers. Powering this spending growth are increased workloads and new applications -- not simply inflationary spending on rising costs and rental price hikes. This contrasts with much of the spending growth reported for 1976 and 1975 (EDP/IR, March 26, 1976). Some of the key indicators of this spending growth picked up by IDC from its representative 128-company model of medium- and large-scale computer sites:

- Hardware spending should outpace spending in other categories -- for the first time since the late 1960s. This spending increase (12.3%) comes on top of price cuts by the major mainframers.

- Budget-cutting will be minimal. Only three companies in the sample anticipated absolute reductions in 1977 EDP budgets -- less than a tenth of the recession-prompted cutbacks of 1975.

- Upgrading. Over 40% of the sample indicated plans to make a major CPU upgrade or addition during 1977. Increased workloads and a commitment to data base/data communications were cited as reasons.

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Although user plans for spending beyond 1977 were exceptionally murky -- perhaps because of general economic trends or a "wait-and-see" attitude toward anticipated new offerings from suppliers -- from past business cycle experience, IDC expects that the demand wave being measured for 1977 will carry over into 1978. Further, since EDP capacity is still tight compared to the business cycle, any pickup in the general economy is likely to expand EDP needs even further. "At worst," says an IDC spokesman, "a moderate GNP growth rate would sustain current EDP spending levels and prolong a high growth rate for all EDP vendor sectors."

Hardware spending

Given that the IDC model represents only medium- and large-scale users -- who do about 75% of all EDP spending -- some of the more significant survey findings within the area of hardware spending are:

- There is high CPU utilization, with the average site working its CPU 15 8-hour shifts/week -- the highest yet recorded by IDC in these surveys.
- The price/performance advantage of IBM's 370/138 and 148 is having its effect on user acquisition plans . . . and other vendors' prices.
- This round of new hardware prices is enticing users with smaller rented or leased systems into upgrading (60% of the qualified users in the sample) and making an "all-IBM" approach to DP more feasible than before.
- New peripheral offerings -- especially the IBM 3350 disk system -- are finding their way into user plans. Significantly, much of this activity will accrue to mainframers; except in terminals, the independent share of value shipped will drop, despite a volume increase.

1977 EDP BUDGETS FOR ESTABLISHED U.S. COMPUTER USERS
(Preliminary, Copyright 1976 by International Data Corporation)

Category	% of Total EDP Budget	% Change, 1976 to 77
Hardware Spending	35% - 40%	
Large Users		10.2%
Medium Users		13.7%
Salaries	45% - 50%	
Salary Upgrades		6.2%
Salary Additions		2.8%
Supplies	7% - 9%	6.5%
Transmission Facilities	0% - 10%	16.7%
Outside Software/Consulting	Negl.	10.9%
Outside Services	Negl.	4.2%
TOTAL BUDGET		
Large Users		up 8.5%
Medium Users		up 12.7%
Weighted Average		up 11.1%

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Other budget items

In line with reduced inflationary pressures, employers seem less inclined to grant the generous salary hikes of years past. EDP salaries for 1977 are projected to increase 6.2%, compared with this year's growth of 7.5%; there will also be less in the way of staff additions -- 2.8% versus last year's 4.5% growth. Programmers and analysts with DB/DC skills are still in high demand, while most operations personnel face a generally declining job market. Keypunch operators are feeling the effects of the move to on-line operations and source data capture as computer operators feel the effects of site consolidation and the less personnel-intensive disk-based operating environments.

Transmission facilities, though growing slightly less this year than last, still lead other budget items thanks to network expansion by large-scale users and implementation by medium-scale users. Perhaps reflecting the pall cast by the demise of Datran, virtually all the users sampled except those already using independent carriers intend to stick with AT&T. Outside software should also experience good fundamental growth in 1977 as users acquire accounting packages, system utilities, report writing routines, and specialized industry-applications packages. In supplies, the inflationary pressures on paper-based media have subsided, and magnetic media prices are remaining competitive . . . in part because more users are turning to competitively-bid, quantity purchases.

Industry groups tapped in the IDC survey displaying better-than-average budget growth included petrochemicals, durable goods, medical services, banking and insurance, state and local government, retail/wholesale, and commercial service bureaus. Those with below-par growth were food processing (a leader in 1975/6), consumer goods, communications/transportation, utilities, and other services. In general, services continue to outpace manufacturing in anticipated spending growth . . . reflecting the general shift of the economy toward a service orientation.

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Oracle at Delphi

TECHNOLOGISTS LOOK TOWARD THE YEAR 2000 AND BEYOND TO FIND . . .
ELECTRONIC MAIL, HOME COMPUTER SYSTEMS, 50¢ CPUs, WOMEN PRESIDENTS, ETC.

Along with the more nitty gritty forecasts presented by IDC at the conference on distributed processing held at Hilton Head (see page 1), a forecast of long-range trends in technology was generated from a selected sample of attendees. Using an abbreviated "Delphi" technique, IDC came up with the tabulation presented in part on the opposite page.

In all it was an interesting exercise -- fun sprinkled liberally with grains of truth -- that provided conference goers with both food for thought and after dinner levity. For, the attendee-seers were not limited to the computer industry, but allowed to tune their crystal balls into such mystic realms as teleconferencing, energy industry transmogrification, robotokinetics, and interplanetary space travel. Not to mention the outcome of the IBM-U.S. trial.

Perhaps one of the most significant findings of the survey -- sent as it was strictly to computer-types -- was that while thousands of people may live in space colonies by the year 2100, full time programmers and DP managers will never become extinct . . . and, considering it was a conference on distributed processing, the admission that no matter how cheap bubble memories get or when terminals are commonplace in the home, central site data processing will never disappear.

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IDC'S LONG RANGE TECHNOLOGY FORECAST VIA "DELPHI" SURVEY TECHNIQUE

1980

- 16K RAMS as bulk of memory shipments
- Facsimile under 15sec/page
- IBM-U.S. suit resolved
- Nonimpact typewriters widely available
- Bubble memories in commercial terminals

1985

- Computer with S/32 power available under $1,000
- 1MB microsecond access memory under $1,000
- Fiber optics for short distance communications
- Image capture systems begin to replace OCR/MICR
- Hand-held matrix printers widely available
- CPU with 370/135 capability for under $5,000
- 16-bit MPUs under 50¢ (OEM)
- Most datacomm at 1200 baud
- English Language programming commonplace
- Plasma replaces CRTs
- Nonimpact printers for most computer output
- Punched cards 90% gone

1990

- Electric autos for most urban transportation
- 4-day workweek
- Energy availability restricts economic growth
- Portable telephones widely used
- Electronic mail common
- Satellites for most business datacomm
- Most large CPU sites use building-to-building satellite transmission
- Most business decisions aided by computer models
- "At-home" computer shopping
- Powerful home computers for 1 month of executive's pay
- Most memory at remote vs. central sites
- The last general-purpose disk drive will be made
- One billion characters of millesecond access memory under $1K
- Terminal stations 80% of hardware shipments
- Voice input widely used on computer systems
- Airships for long-haul of most freight

2000

- Supersonic jets for most transcontinental travel
- Woman president of the U.S.
- Man lands on Mars
- Parents are able to choose a baby's sex
- Robots for home use
- Visual display/hard copy for most business phones
- Teleconferencing in place of most business meetings now requiring travel
- Zero population growth most nations
- Solar (and wind,wave) energy supplies over 50% of U.S. needs
- Electronic systems for newspaper, magazine delivery

2050 ... 2100

- Compatible neurological signals communicate directly with brain
- Thousands of people live in space colonies

Never

- APL as predominant programming language
- Diskette sales surpass other mag media in $
- Most personal decisions aided by computer model
- Full time programmers extinct
- Full time data processing managers extinct
- CPU and memory designers extinct
- Central DP centers and organizations obsolete

Note: Respondees were asked to pick five questions on which they felt especially confident of their answers. The resultant "expert" opinions were mixed, compared to overall survey results, but were generally bullish when it came to technological questions . . . and less optimistic when societal considerations came into play. Thus, the technology might be available for home computers, for instance, but not the social and regulatory wherewithal to make use of them.

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• GIVING THE BOYS IN THE LAB SOME "SHOW-AND-TELL" TIME, IBM last week unveiled some new memory-related devices that could eventually have an effect on computer architecture. The first device, reported in a paper read to a meeting sponsored by the Institute of Electrical and Electronic Engineers, is "an experimental 64-bit dynamic random access memory array -- with spatial density approaching the conceptual limit of the intersection of two conductors." Called a "merged charge memory" and fabricated using charge-coupled device techniques, the array achieves a storage element size of approximately one ten millionth of a square inch by merging the bit line and storage electrode. As a result, says IBM, the device has the advantage of small size and fabrication simplicity.

Also described at the engineering confab by IBM scientists was an electron-beam lithographic system for manufacturing semiconductor wafers. By resolving dimensions smaller than the wavelength of light and eliminating the costly, time-consuming step of making the "masks" used in conventional wafer fabrication, such a system can greatly increase the number of circuits on a single chip. Heretofore, it had not been thought that electron-beam systems would be practical for production use for several years; IBM appears to have bypassed some of the impediments, however, through the use of a magnetically controlled square beam and system self-calibration. One wonders what such a fabrication breakthrough will mean to alternative memory technologies . . . and even if the two devices reported by IBM will clash.

• LET US ATTACH YOUR ATTACHED PROCESSOR, SAYS MEMOREX, which says that it has successfully attached its 6258 Memory System, designed for use with 370/158s, to IBM's 370/158 Attached Processor System. Says Memorex, "in combination with the internal IBM main memory, Memorex offers Model 158 Uniprocessor, Multiprocessor, and Attached Processor System users up to eight megabytes of add-on memory. This is one-third more memory than the maximum offered by IBM." Ah, but does Memorex have a "merged charge memory"?

• TYMSHARE AND MARUBENI WILL SHARE IN A JOINT COMPUTER SERVICES VENTURE . . . as the major U.S. services vendor joins with Japan's third-largest general trading company to form a Japanese computer services company. The new company is expected to begin operations during the first half of 1977, providing a wide range of remote computer services via Tymshare's international network.

There may be a hitch, however: The new company (Kokusai Tymshare Ltd.) has yet to be granted a license by the government for the use of international leased circuits. And according to IDC's most recent issue of EDP Japan Report, there is much intergovermental dissension over whether or not to grant foreign services vendors permits to process data via satellite links from overseas. In fact, since last April. when Japan's computer services market was decontrolled, that country's services market has been in a state of turmoil.

• BUT POS SEEMS TO BE CLICKING IN JAPAN, SAYS NCR, which says it has now installed over 500 NCR 255 supermarket checkout terminals there. And, half a planet away, the Dayton mainframer and terminal maker has installed its first European supermarket scanning system. That installation, based on NCR 255s and an NCR 726 in-store controller, went to Irma, a Danish supermarket chain. The Irma system will use a scanning code similar to the U.S.'s Universal Product Code (UPC).

• BEST WISHES FOR THE HOLIDAYS AND UPCOMING NEW YEAR from publisher International Data Corporation and from the staff at EDP Industry Report!

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" DECEMBER 31, 1976 • VOL.12,NO.12 P.J.McGOVERN,PUBLISHER

Reflection and projection

IDC ON 1977: NEW PRODUCTS GALORE, GROWING USER SOPHISTICATION AS SOCIAL/LEGISLATIVE ACTIVITY BEGINS TO PACE INDUSTRY PROGRESS

With the Year of the Great Bicentennial drawing to a close and the holiday Noels still echoing, EDP Industry Report is moved to reflect on the year gone by. Indeed, it was quite a year -- what with the IBM "Eights," competitive offerings, the Bell Bill, plug-compatible CPUs, Distributed Data Processing, T-H-E trial observing one-year rites, Series/1, and so on. It was a year in which users spent over $30 billion on data processing goods and services . . . prompting computer shipments over 100,000 units worth almost $13 billion.

And what about 1977? After all, no backward glance is worth its salt if it doesn't lead to a forward look. How will computer industry progress manifest itself as the country begins its third century? While long-range forecasts are as cheap as chips are getting to be, short-range forecasts come more dear. But in keeping with the spirit of New Year's resolutions (which sometimes go awry), the Gray Sheet polled the experts at publisher IDC for their opinions on 1977's promise for the industry. Among other things, the IDC seers foresaw:

- New stuff at the high end of the IBM line and the GSD line -- the two entities (IBM and GSD) are not always thought of as one, these days.
- More activity in the plug-compatible computer line, and perhaps an IBM counter in software pricing.
- Major minimakers donning mainframer garb -- if they can offer the support end users demand; more from GSD on the Series/1 as a counter, and and the resultant expansion of the overall market to everyone's benefit.
- Computer services firms coming to grips with the small business computer with their own hardware and/or liaisons with peripherals companies.
- And those peripherals vendors pooling resources through mergers and acquisitions in the endless quest for enough capital.
- Further friction between the colliding computer and communications industries . . . and the eventual involvement of regulators and legislators in more and more aspects of the business.

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But if there was one overriding message in the results (printed on pages 4 and 5) of EDP/IR's straw poll, it's that the industry is growing up and users are becoming more sophisticated in their use of EDP. And as computers pervade more of our daily life, the public -- along with its legislative and regulatory servants -- is taking a more active interest in developments in our industry.

And so the computer industry evolves from a high-technology industry to a service industry . . . where solutions are the product, technology merely a tool. And so it becomes more visible -- and vulnerable -- to forces from without.

Hardware heavies

The introduction of the 370/138 and 148 may have had the most well-defined impact of any single industry event in 1976 (EDP/IR, 7/22 & 10/28/76). Their price performance dropped them out of the cluster of traditional IBM 370s; their rental-to-purchase price ratio signaled IBM's approval of the trend toward more outright purchases and promised a short marketing cycle; their large reloadable control store and megabyte memory increments hint at virtual machine concepts yet to come.

But the real nut of the "eights" is their appeal to users. Studies by IDC report overwhelming acceptance of the systems at capacity-strapped midrange sites. What had been a stable base in 1975 -- 85%-90% of 135 and 145 users had no plans to migrate then -- quickly began churning when the 138/148 hove into view. Now, about half of them are in the queue, and IDC estimates a worldwide census backlog of 2,250 unfilled orders for the 138 and 1,500 for the 148. And it shows in user budgets: IDC estimates 1977 spending for computers at medium- and large-scale sites will be up 12.3% over 1976. Further, hardware spending will outpace that in the other categories measured by IDC for the first time since the late 1960s.

For competitors, the IBM midrange models placed their own mainframe offerings in a new light. Some 1976 developments on that score:

- NCR announced the "Criterion" Series, utilizing new technology and system architecture (E.5/13/76), and reaffirmed its commitment to the mainframe market. Meanwhile, the company began its first full year out of the electromechanical cash register business -- and continued to maintain its considerable lead in POS systems (E.11/12/76).

- Burroughs followed up on a late 1975 promise during the introduction of a new computer family -- another set of "eights" -- and added the B 6800 to its arsenal (E.8/9/76). At the other end, the company attacked the System/32 market with the B 80 (E.5/13/76) . . . and unbundled in the process. But shortly after the 370/138 and 148 announcement (because of it?) Burroughs lowered memory prices on its midrange members of the new family (E.8/31/76). Prices for the 6800 were already competitive.

- Honeywell reignited its minicomputer flame with the Level 6 (E.1/30/76) but did little more than tweak and tune its mainframe line with software, peripherals, and a new small system (see page 8). The recent restructuring of company operations and continued enhancement of the Level 6 has caused widespread speculation on HIS's mainframe future.

- CDC, besides taking time out to break a Guiness World Record for number of computer operations per second (E.9/30/76), continued its thrust in the services and plug-compatible peripherals area.

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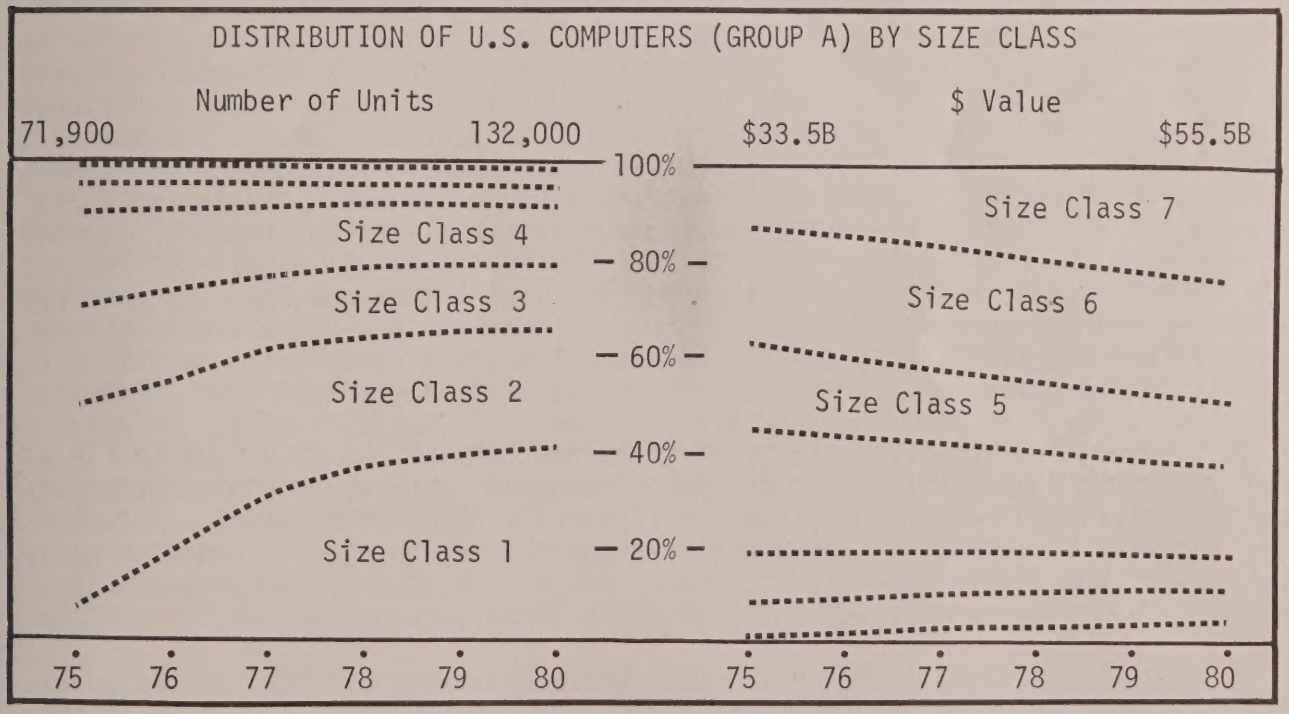
- DEC made several forays into the mainframe market by increasing the batch capabilities of its DECSystem-10 -- calling it the 2040 -- and beefing up the top of the S-10 line (E.1/15 & 12/3/76).

- Univac added new mainframes at the top of both its Series 90 family (E.6/16/76) and its 1100 family (E.11/12/76), revising its midrange 90 Series prices and memory sizes shortly after the introduction of the 138 and 148 (E.8/31/76). In addition, the company joined IBM and DEC in the "network architecture" derby by announcing a "Distributed Communications Architecture" and first DCA product, TELCON (E.11/12/76).

In all the mainframe announcements some trends became apparent. For one, the use of ECL or other fancy circuitry is fast becoming standard, as is the use of competitively priced semiconductor memory. For another, virtual memory and multiprocessing capability are becoming commonplace. But Singer's exit from the industry (E.1/15/76) was just another phrasing of a message users are taking to heart these days: Service, support, and long-term commitment can be as important as the capability of the equipment.

Plug-compatible computers

While IBM's new midrange computers were tussling with those from the other mainframers in the user budget contest, a new breed of computer was gleaning rapt attention from the trade press: The plug-compatible CPU. Amdahl 470V6s, announced in late 1975, began what might be called volume shipments -- while the firm posted hearty financial returns and went public -- and Itel joined with National Semiconductor to offer yet another family of IBM lookalikes (E.10/28/76).



Trends monitored in 1976 and expected to continue into the 1980s show the gradual shift in the installed base mix of general-purpose (Group A) computers. By unit, Size Class 1 (S/32 equivalents) will show remarkable gains as small business computers find their markets; by value, 370/158 and 168 size systems will grow as a percentage as more and more on-line data bases are implemented.
Min

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TAKING A NEW YEAR'S LOOK AT 1977

While wrinkled 1976 and dewy-eyed 1977 exchange the standard, EDP/IR thought it might be fun to speculate about 1977 in the middle of its 1976 review. Although more in the nature of educated conjecture than "cast-in-concrete" predictions, the comments below spring from on-going trends and are drawn from the considered opinions of the staff at IDC, EDP Industry Report's publisher and the industry's foremost market research firm.

So, join us as we scan the landscape of 1977 and look for:

• Something new from IBM at the high end of the 370 line -- a replacement/growth product for 158 and 168 users. The question of whether such a product is a reaction to Amdahl or not may be moot: Users are topping out on their current systems. This evolution within a "370" framework will probably stress multiprocesssing -- as opposed to blockbuster uniprocessing capabilities -- and will continue the increasing use of microcode and firmware. MVS will be a likely initiation fee. Other new mainframe offerings from the Giant will probably include entries at the smaller end of things -- but with an architecture compatible with the overall trends toward multiprocessing and computer networking. Larger and larger memory -- at lower cost per byte -- will also be announced.

• Something new at the high end of GSD's line as well. System/3 has been evolving for some time now, and another upgrade option would make sense. Along these lines, a "big brother" for the entry-level System/32 might be in the offing . . . as a way to keep those new IBM customers in the fold.

• Also from GSD, something more for Series/1. This could manifest itself in more software releases -- the original was unaccountably barren -- and/or the incorporation of the processor in other products. (The S/32 "engine," for example, is used in the 3790 and some specilized laboratory gear.) The result could be a broader thrust in distributed processing based on the Series/1 -- the 3790 doesn't seem to do the trick -- perhaps entailing a 3270 upgrade or replacement and the decentralization of control over terminal offerings. The Series/1, it should be noted, might make a handy controller in a clustered terminal system.

• A true move by IBM toward separate pricing of software, perhaps coupled with new mainframe announcements. As the fees for the new SNA networking modules illustrate (E.11/12/76), IBM likes the concept. The software may, in fact, be offered in hardware devices . . . in the form of microcoded PROMs, special-function processors like the 3838 Array Processor (E.10/28/76), etc. A data base management processor -- perhaps with a new DBMS language -- would be a natural for the Giant. With hardware costs steadily dropping as a percentage of system value, the return on software investment becomes of interest. And one of the benefits of repricing software to reflect the true "value added" will be the dulling of the plug-compatible CPU edge. Should IBM divide its markets with special-function processors, that edge could disappear entirely.

• Nothing of import in the IBM-U.S. trial other than the end of the government's presentation and the start of IBM's. An out-of-court settlement is not considered likely by most observers. A first round decision in the IBM-CalComp trial is expected, however. Although courtroom followers of that particular legal drama decline to predict a winner, the initial finding in the jury proceedings -- as did Telex's -- is bound to have a profound effect on the follow-on trials of Memorex, Transamerica, etc.

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• Minimakers couching their products in even more software and service as they pipe the distributed processing theme in the quest for customers. Whether or not they have the ability to supply that support is another matter -- especially with IBM now in the race. Conversely, mainframers jumping into minis -- HIS, IBM, and CDC -- may not find it a "piece-of-cake" competing with DEC, Data General, Hewlett-Packard and the others on their home turf.

• The emergence of the "sophisticated end-user" market as a distinct and fertile field for plying the computer trade. IBM's Series/1 adds legitimacy to the categorization; while distributed processing provides a vehicle for equipment sales. Although the S/1 looks like a product that could impact the sales of the likes of Four-Phase and Datapoint as well as the traditional minivendors . . . market expansion will probably cancel any negative impact.

• Large service companies to move into the hardware area, offering a systems house approach to minis and/or terminals for their customers. This trend could easily lead to service company participation in -- or acquisition of -- computer peripheral companies.

• And, in that vein, more mergers among peripheral companies like the one between Sanders and Harris (see page 8). In addition, some peripheral manufacturers will become "systems houses," buying many of their components from the outside and deemphasizing actual hardware manufacturing. Some attrition among minicomputer suppliers would not be surprising.

• More systems houses to offer packages tailored for small business markets. In fact, this whole segment of the industry will grow rapidly, as the charts on page 3 indicate. Univac will finally announce an entry in this sector (E.9/30/76) . . . and others besides DEC and IBM will try to wring word processing applications out of their small business systems.

• AT&T to get even more aggressively involved in data processing, or whatever it is that a Dataspeed 40/4 and a Transaction Network Service provide in addition to straight data communications. Developments in this area will be especially interesting to watch . . . with some observers already claiming that the Bell System's acquisition of Amdahl CPUs is in part a reaction to IBM's involvement with data communications via Satellite Business Systems, on whose application the FCC will rule sometime in 1977. It is also possible that AT&T will announce a networking capability -- along the lines of its Transaction Network Service -- that will obviate some of the provisions of IBM's SNA.

• Legislative activity to rise to paramount importance as the "Bell Bill" (E.5/28/76) gets scuttled in favor of a comprehensive Congressional review of the entire Communications Act of 1934. And with the report of the EFT Commission due late in the year, the industry can expect Congressional scrutiny of the banking industry . . . with an eye toward computers, communications, electronic banking, new security requirements, new types of competition, etc.

• The progress of the computer industry to be paced more and more by the social and legislative process . . . the unknowns in the algorithm out of which computer industry progress is generated. This is a natural outgrowth of the industry's increasing interaction with the general public -- at the supermarket, the bank, the office, and in company line operations under distributed processing -- and may well shove the effects of technology and the computer industry business cycle onto a back burner.

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IBM's counter -- if indeed there was one -- came in the form of "Attached Processor Systems" for the 370/168 and 158 (E.2/27 & 10/28/76). Software-void CPUs tacked onto host uniprocessors, these systems offer computing capacity somewhere in the gulf between uni- and multiprocessor at less than a corresponding cost. The 370/158 APS was particularly competitively priced, leading some observers to believe that the Giant was beginning to take the threat seriously.

But the real brunt of the plug-compatible computer fad may be felt by IBM's competitors. As a disgruntled Sperry Univac spokesman said at his company's unveiling of the 1100/80, "now a DP manager required to go out on competitive bid before he can buy the IBM system he wants can have his cake and eat it too -- sign with an IBM competitor and get an IBM computer. It makes it all the tougher for us." That may explain IBM's relatively quiet acceptance of the Amdahl and Itel systems. As long as users are thinking IBM -- and roped in with IBM software -- they're primed for new IBM products.

Miniland circa 1976

In minicomputer circles the year progressed as all years seem to -- with a sprightly over-30% growth rate and continued inclusion of more software and service in the products. Honeywell introduced its Level 6 mini (E.1/30/76) and follow-on software (E.11/24/76), stressing its commitment to minicomputers and its plans to market to distributed processing environments. DEC added peripherals and software to its line and packaged the LSI-11 into an entry-level system for its business-oriented Datasystem line . . . while remaining strong in the mainframe market with upgrades to its System-10.

Data General advanced further into vertical integration with production of its own semiconductor for the Micronova and manufacture of more peripherals. The Southboro minimaker also added new operating system software to its Eclipse series (E.9/17/76 & 11/24/76) . . . bringing its Eclipse computers even closer to true end-user markets. As a sidebar, DG made plans to divest itself of its POS system business in a deal with Litton's Sweda Division and to acquire Digital Computer Controls, its courtroom foe in a trade secrets suit. Competitor Hewlett-Packard recharged its product line with the HP 3000 Series II (E.6/24/76) and Series 1000 E.11/24/76). Meanwhile, the other smaller minivendors continued in the same vein -- adding new systems and, more importantly, new software and enhanced service to their product brochures.

As a result, says IDC, by 1980 the services component of minicomputer revenues will be almost 20% -- or $1 billion -- of total revenues. The product mix will change, too. Microminis like DEC's LSI-11 will swell in annual shipments from 13,000 units in 1976 to over 100,000 in 1980 and will account for 10% of minicomputer revenues by then. Superminis of Eclipse 300 or PDP-11/70 ilk, on the other hand, will account for almost 50% of those 1980 revenues on a tripling of shipments to 28,500 in 1980.

But the real unknown in the 1980 minicomputer industry will be traceable to the most noteworthy miniland event of 1976: IBM's introduction of the Series/1 for sophisticated end users (E.11/24/76). Long in the testing phase, Series/1 and its top-down marketing approach represent a new way of doing business for IBM and somewhat for the minicomputer industry as a whole. But it may or may not affect the other minivendors, as Series/1-caused market expansion contrasts with its competitive effects. Follow-on announcements will be especially significant inasmuch as they delineate IBM's further intentions in minicomputers.

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Data communications

The past year saw further evidence of the growing intersection -- some say clash -- between the computer and the communications industries. The year began just after SBS filed its satellite plan with the FCC (E.12/31/75) -- the FCC has yet to grant or withhold its approval -- and continued on to include:

- The Bell Bill, the introduction of which shifted AT&T's long-standing feud with the FCC to a new forum (E.5/28/76).

- An appellate court go-ahead for an FCC program allowing customer-owned interconnect equipment to be hooked to the public network without carrier-provided "Data Access Arrangements" (E.6/24/76).

- Initiation by the FCC of a Second Computer Inquiry to examine the graying boundary between computing and communications (E.8/9/76).

- Datran's collapse (E.8/31/76).

- The addition of networking capability by IBM to its Systems Network Architecture (SNA); and the introduction by Univac of its networking scheme for the future (E.11/12/76).

- FCC clearance of the Dataspeed 40/4 for interstate use -- despite staff objections -- and a promise to examine the data processing implications of the 3270 competitor at the Second Computer Inquiry (E.12/3/76).

There were other events, too, to affect data communications . . . from patent suits in the modem market and rate-making at the FCC to new networking products and transmission services. But as the events of 1976 illustrate, the most important developments likely to mold the data communications industry between now and 1980 may well be legislative/judicial ones. Datacomm users will have to become aware -- perhaps painfully so -- of that peculiar world outside.

Other developments

In other sectors of the industry 1976 was a "mixed bag." The computer services industry continued to react to the small business system threat and stepped up to a new plateau of growth in its drive for 1980 revenues of $10 billion (see E.10/18/76). But almost two-thirds of the 13% growth from 1975 to 1976 in user spending for DP salaries turned out to be inflationary -- while only 25% of total spending growth was inflation-caused (E.3/26/76). Prospects for independent peripheral makers continued to vary according to product lines and financial clout . . . with acquisitions and mergers the bellwethers of industry volatility.

And on at least one other front 1976 was disheartening. For over a year now IBM and the Justice Department have been in court, and while there has been progress . . . it's more easily measured month by month than day by day. Now CalComp is having its day in court; others will follow in 1977. Meanwhile the Department of Justice trudges along in its pursuit of AT&T. No matter whose is the righteous side in all these cases, an industry as fast-paced as this one is bound to be ill-served by such slow-moving litigation . . . if served by litigation at all.

1976? It was a good year, better than many. And it should make an excellent springboard for 1977 . . . a year of promise and potential.

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• JUST IN TIME FOR CHRISTMAS, HONEYWELL announced a reshuffling of its corporate organization and a renewed attack on the small systems market. This month the company announced the reshaping of its North American Operations (NAO) into the United States Information Systems Group and the establishment of three new profit centers: The Large Information Systems Division (Phoeniz AZ), the Small/Medium Information Systems Division (Waltham MA), and the Marketing and Services tion Systems Division (Waltham MA). Marketing chores for Canada and Mexico, formerly under NAO, will be transferred to international operations.

Honeywell's new thrust in the small systems market consists of a redesign of its Level 62 small-scale systems to allow users more configuration flexibility. Where once users had a choice between only the 62/40 and 62/60 systems, now they can expand from an entry-level system in three directions: memory, peripherals, and CPU performance. In addition, Honeywell is offering a greater variety of contract plans. The 48KB-to-224KB new Level 62 system is aimed primarily at the System/3 market, says the company, and will rent range from under $1,800 a month to over $12,000.

• ALSO IN MID-DECEMBER, BURROUGHS ANNOUNCED NEW COMMUNICATIONS SYSTEMS: The B 870 and 860 Communications Processors. Along with the new systems, Burroughs released a comprehensive, generalized store and forward message switching application program product designed to enhance the 860 and 870 in network management applications such as Electronic Funds Transfer. The three models in the two families run a gamut of capabilities, with CPUs operating at 1 or 2 MHz and equipped with 1 or 2 additional data communications processors each with up to 16 lines. Memory ranges up to 147KB; 9 I/O channels are available. In addition, two disk storage subsystems provide varying data access speeds and capacities. Software available includes a network definition language, a message processing language, and Burroughs' Master Control Program. Monthly lease rates for a minimum B 860 system could be less than $1,000; a typical B 870 in a larger configuration could have a monthly lease rate of $2,300.

• ANTITRUST IS IN THE AIR . . . and now Computer Automation is suing TRW and Datapoint on charges of antitrust violations. Says Computer Automation, the defendants restrained trade, boycott CA products, and monopolized relevant markets regarding CA's SyFA computer system. Computer Automation also complains that Datapoint, with TRW's help, acted in bad faith when it sued CA and some of its employees for trade secret violations. CA asks treble damages for loss of profits, legal costs, and loss of confidence by customers and financiers.

• HEWLETT-PACKARD HAS SOME NEW 21MXs, namely two new E-Series models that execute programs 70% and 100% faster than earlier M-Series units. The speed enhancements spring mainly from improved micrologic timing within the CPU. The U.S. list price for a small 16K model is $8,550, while for a larger 32K, Fast Fortran processor with maximum user-accessible microprogrammable intruction store it's over $36K. Introduction of the E-Series models follows shortly after HP's announcement of a memory price reduction of 30% for 21MX computers.

• AT&T IN DATA PROCESSING? Now CADO Systems Corporation has a "new small business computer/transaction terminal" designed to run off the Dataspeed 40, primarily in data entry/document origination applications. CADO contends that Bell will produce 300,000 sets in the coming years, providing a nice market for CADO add-on.

• FROM IBM: THE FIRST 370/138 has gone to Bretea Corporation (Irvine CA).

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" JANUARY 31, 1977 • VOL.12,NO.14 P.J.McGOVERN,PUBLISHER

Inside: Sperry's BC/7; IBM's Office System 6

HONEYWELL PUMPS UP ITS MAINFRAME AND TERMINAL PRODUCT LINES INTRODUCES ITS ANSWER TO SNA -- "DISTRIBUTED SYSTEMS ENVIRONMENT"

> Of all the manufacturers of computers operating today, only Honeywell has designed, produced, sold, installed, and serviced both general-purpose and minicomputer systems for well over a decade . . . and of those who now offer such an extensive product line, only Honeywell is an influencing force in both the information systems and controls systems markets. As a result, Honeywell has a unique blend of products, experience, and know-how to provide the kind of sophisticated distributed processing capabilities -- ultimately including process control and sensor based systems -- that we anticipate will be an evolving market requirement.
>
> -- E.W. Spencer, Honeywell President and CEO, at press announcement, January 27, 1977

In what one speaker called "one of the most important announcement's in Honeywell's history," the company lifted some of the mist off its product line intentions for the future. Coming off a year of sharply increased earnings and minicomputer revenues -- but lackluster mainframe shipments -- the announcement was a nice three-point fix for those who chart the company's progress. And if users change their ways as Honeywell expects they will, then the company will have a chance to turn its sprawling product line and industrial controls heritage -- considered liabilities by some in the past -- to its advantage.

The three points of Honeywell's plans entail:

- A wager on distributed processing. HIS sees its minicomputer and mainframe markets blending under DDP . . . and itself as a one-stop shopping center for DDP advocates.

- Mini/maxi technology. The new large system technology introduced -- and the use of ready-made Level 6 technology in remote processors and controllers -- will be an integral part of future product offerings.

- A communications strategy. Called "Distributed Systems Environment" and billed as a product strategy, DSE will bind together the various parts of Honeywell's DDP offerings.

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It's a good plan, suited to Honeywell's capabilities outlined above by President Spencer. But distributed processing isn't going to come about overnight . . . and its rate of acceptance will have a bearing on how soon Honeywell can make the whole of its product line greater than the sum of its parts.

Distributed Systems Environment

DSE, says Honeywell, is the company's "formal entry into the computer environment of the 1980s" . . . and its announcement marks the "midpoint between the introduction of our Series 60 systems and their implementation in the sophisticated distributed networks of the 1980s." Like Sperry Univac's DCA (EDP/IR,Nov.12, 1976), it's not a product but a development strategy. Its major components:

+ Use of High Level Data Link Control (HDLC), the industry's adopted standard. Level 6 minis and the new large-scale Model 66/85 announced with DSE will be the first products to use HDLC.

+ The Level 6 mini as network processor/controller. The first products here include a new front-end processor (Datanet 6678) and new intelligent and remote-batch terminals (DCT 6/500 and RBT 6/30X).

+ The introduction at a later date of satellite processors, also Level 6-based, to handle multiple job streams from I/O devices and host processors . . . true distributed processing systems.

Starting with the products announced last week, DSE will slowly engulf Honeywell's entire Series 60. The change will be gradual, however, since most users are phasing into DDP that way . . . and Honeywell will be "relying heavily upon user experience throughout what we are sure to be an important next few years." The company feels that its Level 6 technology and the new technology introduced with the Model 66/85 will be flexible enough to enable its product line to evolve right along with users' needs.

A new maxicomputer

While the Level 6 will be scattered throughout future DSE products, the technology engendered in the top-of-the-line Model 66/85 will be put to use too. That technology encompasses:

A Walk-In Computer?

You can make your circuits faster, but not the speed of light. And in modern, high-performance computers the speed of signal transmission between components is critical. With LSI techniques jamming hundreds of circuits onto ceramic chips and those chips onto tightly packed boards, the distances between those boards becomes a gating factor in the speed of computing.

So, you change the way you package the boards and the packages of boards. In the Model 66/85, rather than configure a central system by connecting boxed components (memory, power supplies, CPUs, controllers, etc.) Honeywell connects them as components -- taking advantage of space and cooling efficiencies -- and puts them all in one big box. Called the "Central System Enclosure," and less than 20 feet by 15 feet by 6 feet high, the box is accessible only to Honeywell customer engineers. To service any of the central system components, a CE simply . . . walks into the computer.

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HONEYWELL ON DISTRIBUTED PROCESSING

There are as many definitions of "distributed processing" as colors at a circus . . . and Honeywell's seems eminently sensible. "When we speak of distributed processing we are referring to two or more processors operating on an organization's data in a cooperating manner." In catering to this market just defined, Honeywell determined that its DSE must be flexible.

"But flexibility alone is not enough. With multiple computing centers autonomously operating under their own procedures and protocols, the stage would be set for an administrative and processing nightmare. Control is also a major requirement. Accordingly, we have structured our approach to strike a balance between the freedom and flexibility of local access, and the necessity for maintaining overall system standardization and control.

"Specifically this means:

"-- The ability to compile on one machine and execute on another
"-- A common set of data structures
"-- A common set of protocols
"-- Local transaction capabilities
"-- File transfer capabilities
"-- Ease of use

"This trade-off between flexibility and control is the key one to be made by the user." Indeed, when it comes to implementing DDP, control is the major issue. And depending on whether you're a local manager who wants a better handle on his own operation -- or a corporate MIS executive who sees his empire diffusing into a hopeless melange -- control can cut two ways.

+ Micropackaging -- a chip-to-board development and manufacturing process that heavily automates the design and construction of large systems.

+ Current Mode Logic circuitry -- similar to, but not the same as emitter-coupled logic (ECL), that offers cooler and faster processor operation in less space than conventional technology.

+ Liquid cooling -- partly as a result of micropackaging. A special diaphragm, when pressurized by liquid behind it, conforms to the surface of the micropack and removes heat, prolonging component life.

+ Multidimensional processing software -- which allows the mix of transaction, batch, and timesharing processing to be varied dynamically.

The Model 66/85 has touches of the distributive itself. A uniprocessor comes with CPU, System Control Unit (SCU), I/O multiplexors, cache buffers to main memory and disk storage, and up to 2 million words (8MB) of MOS memory. Peripheral controllers contain microprogrammed microprocessors. An extra SCU can be added to a system, as well as three more CPUs. Purchase prices for 66/85s will run from $4.5 million to $7.5 million depending on configuration. A dual-CPU 66/85, for example, with 1 million words (4MB) of storage, console, two card readers and a punch, two high-speed line printers, dual tape subsystems, and two Datanet 6678 front-end processors would cost $128,082 per month on a six-year rental contract or $6,207,623 purchased. Honeywell expects such a dual CPU setup to be the Model 66/85's most popular configuration.

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(On a CPU and memory comparison, the 66/85 falls between the IBM 370/158-3 and 168-3 in price per equivalent storage. Memory prices are the same as other Series 60 systems: about $195,000 per 256K words, about one megabyte.)

Announced along with the 66/85 and the new Level 6-based terminals and front-end were three medium- to large-scale Level 64 computers -- the 64/60, 64/50, and 64/30. The new models extend the communications and memory range of the middle of Honeywell's product line. In addition, the company indicated that significant enhancements to the GCOS operating system are imminent.

The Level 6 revenue machine

When HIS announced it a year ago, the Level 6 family of minicomputers was little more than a software-lean collection of OEM products. Since then, however, all sorts of software have been added and a new higher-performance top-of-the-line announced (EDP/IR,Jan.21,1977). The company's commitment to its minicomputer operations is beginning to show.

And its minicomputer revenues are responding. By the company's own count of computer revenues, about $1 out of every $8 came from the mini sector last year . . . and mini revenues are growing by almost 25% per annum. Mainframe shipments for 1976, on the other hand, were actually down from the year before, according to IDC's yearend estimates. With Level 6 minis going into HIS peripherals now, the smaller systems will begin to account for more and more of overall revenues.

But will they help sell mainframes? That depends on how much and how fast distributed processing catches on. At the DSE press conference, Honeywell couldn't forecast how many Level 6 minis would ultimately end up tied to Honeywell hosts . . . but it could be plenty. Honeywell is one of its own best customers, with fully a third of its stated mini revenues coming from shipments to its own divisions. A few customers like itself and business could be booming.

Until then it should be interesting to clock the acceptance of DDP . . . and see the extent to which Honeywell's commitment pays off.

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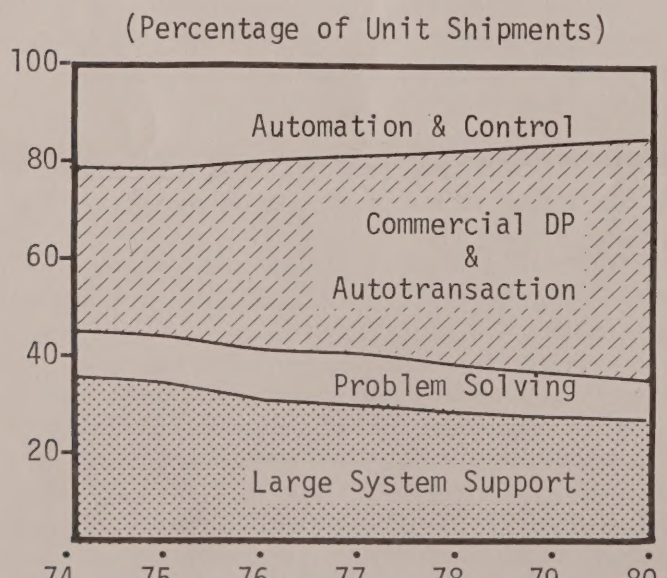
U.S. OEM MINICOMPUTER SHIPMENTS BY APPLICATION TYPE



By 1980 the number of units shipped to OEM markets will surpass 90,000. By application type, Commercial DP and autotransaction will be the only category to grow in percentage. Many of these systems -- and some in the other categories as well -- will find homes in DDP products.

End user units will too. By 1980, according to IDC estimates still in the works, about 40% of end user minis will be in DDP applications. Few are now. These will include IBM Series/1 minis, which IDC expects to expand the market by almost 10 percent.

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A new business for Sperry

SPERRY UNIVAC UNVEILS ITS BC/7 SMALL BUSINESS COMPUTER WITH BUS DESIGN, INNOVATIVE SOFTWARE, S/32-RANGE PRICES

Boston commuters, at least, are being bombarded these days by computer radio commercials during morning drive times. A while back it was the service firms, such as SBC and ADP, competing with IBM's System/3 and DEC's Datasystem 310. Recently IBM has been flooding the waves with System/32 ads. And the latest voice is Sperry Univac, with ads and jingles for a new computer that, by implication, can "keep Mary from getting two paychecks while you go empty-handed."

The new small business computer, which Sperry says in help wanted ads has stardome "in its destiny," is the BC/7 reported in these pages last fall (EDP/IR, Sept.30,1976). The long-awaited result of Project ACORN, the BC/7 was test marketed across the country last year in eighteen metropolitan areas.

Whether or not it lives up to its billing remains to be seen . . . but the BC/7 does look impressive. Sperry contends that its decision to enter the small business market was one of its most significant decisions of the decade and "combines the dynamics and growth potential of a new venture with the solidarity of an established industry giant." As a machine, the BC/7 has the standards that a B 80 or System/32 competitor must have -- floppy disks, memory to 64K characters, various peripherals, and application packages for specific industries. Its long-term lease prices range from $810 to over $17,000 a month; purchase prices vary from $28,268 to over $60,000. Some of its more interesting features:

- Bus Structure -- along the lines of a DEC mini, the BC/7's components all connect to one another by a single high-speed system bus.

- Macro Processor -- hardwired to the CPU and system bus, this device executes macro-level operations generated by the RPG II compiler.

- System Control Language -- using English commands, the operating system provides the user a "menu selection" of programs and files. The operator has no need to learn rules of syntax for the language.

- Programming Language -- called "Escort," this high-level language lets users with no programming experience specify data management requirements by tutorial conversation methods. (RPG II is also available.)

- Customization -- a procedure called "Pixie" allows the user to tailor Sperry-provided canned applications programs to his own use via an interactive question and answer method.

Perhaps the most significant feature of the BC/7, however, will be its marketing. Sperry has set up an entirely new sales force, culled for the most part from competitors' sales organizations, dedicated to the small business market. "The Sperry Univac marketing concept calls for Sales Reps to play the leading roles, and provides the finest software supporting cast in the industry to back them up," the company's employment ads say.

And so -- with a product and timing almost exactly as predicted in these pages -- Sperry Univac has jumped into the small business computer market where marketing and service outweigh technical factors. So, we have jingles.

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Another kind of distributed processing?

IBM ANNOUNCES ITS OFFICE SYSTEM 6 WORD PROCESSOR INCORPORATES INK JET PRINTING AND FLEXIBLE DISKETTE STORAGE

The press release was rather sedate, issuing forth from IBM's Office Products Division (on stationery that mistakenly included GSD's letterhead), but the two-page spread in the Wall Street Journal wasn't. Its opening statement summed up the current state of word processing affairs rather succinctly:

> The last ten years has been a time of tremendous growth in Word Processing technology. Machine has followed machine with great rapidity. The range of equipment now available is almost bewildering in its variety.

The object of this advertising fanfare was IBM's new Office System 6, a diskette-based word processor system announced last week that ties IBM's mag card selectrics in with an editing/information processor and ink jet printer. The Office System 6 comes in three models . . . one with all the features, one without the mag card capabilities, one without the printer. The printer, incidentally, is the one used in the 46/40 Document Printer introduced last summer (EDP/IR, June 16,1976) and renamed the 6640 with this announcement.

All well and good, IBM has a new electronic typewriter . . . except the OS 6 is more than that. In many ways it has the flavor of a computer about it. With a little imagination its features prompt one to think of it as the office system analogue to distributed processing.

Those computer-like features include:

- Communications -- the OS 6 can communicate (2770 emulation) with just about all of IBM's product line, including the System/32 running under Word Processor/32 software and IBM Mag Card II Typewriters with the appropriate communications attachments.

- Remote operations -- incoming transmissions can be stored on mag card or diskette or printed directly. The sender can even select type fonts electronically. In IBM's words, "By handling routine record processing functions, OS 6 can free computers for more complex tasks. Through computers, Office System 6 information processors can communicate with a variety of terminals in extensive internal or external networks."

- Processing capabilities -- through an 8K buffer and microprogrammed logic circuitry, the OS 6 Information Processor can manipulate and process text in sophisticated ways. This manipulation includes many automatic functions and extensive operator prompting.

- File handling ability -- the OS 6 can store company files on its diskettes and upgrade, revise, or reformat them as necessary. Files may be merged from the OS diskettes -- or from communicating computer systems -- with the text being processed for output.

- Storage medium -- the 274K flexible diskette initiates yet another round of IBM customers to that particular form of data storage. The fact that an OS 6 model is available without mag card capability seems somehow significant.

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Meanwhile, back at the office

As an office system, the OS 6 has some high-powered features (not the least of which is its prices). The system displays six lines of text at one time on its IBM 5100-like scope, with two or three more lines for operator prompting. Blocks of text can be moved from page to page, stored files can be resequenced and reformatted, and line endings and page lengths can be adjusted automatically. Normally, documents will be originated on mag card typewriters and then input into the OS 6 for revision, editing, and printing. Documents can also be assembled by combining stored paragraphs or by merging stored segments of text with variable file information. One diskette holds about 130 pages of text.

Printing takes place at 92 cps with a print quality similar to that of a selectric with a multi-strike carbon ribbon. Three pitches and three preselected fonts are standard. These may be varied electronically when printing.

Monthly rental charge for a printerless OS 6 (IBM 6/430) is $470, purchase price is $16,450. For the cardless model (IBM 6/440), they are $800 and $28,000. A full-blown OS 6 (IBM 6/450) rents for $910 per month and costs $31,850 to buy, not much less than a small System/32. A standalone 6640 Document Printer rents $685 or can be purchased for $23,980 . . . a 17% cut from the price at which it was introduced. In conjunction with the OS 6 unveiling, IBM announced communications features for the Mag Card II Typewriter and a software utility for the Word Processor/32 enabling it to communicate directly with an OS 6 product.

Whither GSD?

The fact that GSD was inadvertently included in the letterhead of the press release is ironic . . . for one of the OS 6's competitors may well be the Atlanta division's Word Processor/32, one of those System/32s optimized for text editing. GSD, of course, naysays the idea of OPD as a competitor -- but was well-braced for questions along those lines.

In fact, the integration of word procesing with data processing hasn't been particularly successful, as DEC's experience with the Datasystem 310W shows. The two operations are separate in most organizations. But the OS 6 looks like an end run. There's a computer in it, or course, but a transparent one . . . it poses no threat to office procedures.

And with the OS 6, IBM seems to be aiming its office users in the same direction as its small business system users. If the two camps merge -- without a violent clash -- they may synthesize new demand for IBM products. And IBM will have taken a "Giant" step toward the truly integrated information system . . . and that electronic office that is always just a few years away.

WHERE THE INK COMES FROM

IBM's ink jet technology is a hand-me-down, stemming from patent agreements with A.B. Dick made in 1972. (A.B. Dick once marketed an ink jet printer dubbed the Videojet, but clogging nozzles caused its demise.) That cross-licensing agreement, which cost IBM $1 million, was to have expired this year, but now the two companies have extended it through 1980. IBM will fork over $3.5 million this round, receiving rights to A.B. Dick word processing, copier, and facsimile patents. A.B. Dick will gain access to IBM word processor and ink jet patents issued before 1981. The Japanese also hold ink-jet patents . . . all of which means the ink could be flying in the ink jet market by 1980.

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• WHEN YOU BAIL OUT, DON'T MESS AROUND seems to be the implication in Sanders Associates latest moves. First the company announced it was getting out of the computer terminals business by selling its Data Systems division to Harris for approximately $15 million in cash and $2 million in assumed liabilities. (That acquisition was just recently completed.) Then the company withdrew its $255 million antitrust suit against IBM for a paltry $10 million -- about five hours worth of IBM revenues. The IBM payments will come in the form of agreements to pay Sanders for development of certain computer-related products. According to Sanders, these products will bear no relation to the line sold to Harris.

• SOMETHING NEW FOR IBM JAPAN TO THINK ABOUT: HITACHI'S M-150, a midrange 370 competitor and seventh in the Hitachi-Fujitsu jointly developed M Series. The 64KB to 1MB system is considered Hitachi's counter to the 370/138 and an upgrade machine for its HITAC 8250 and 8350 computers. The monthly rental price for the M-150 will be competitive -- about that of a 370/125. Hitachi has a five-year shipment target of 1,000 systems.

Not to be outdone in standing up to the Giant, Hitachi's domestic rival Fujitsu has just announced three new small business computers that it will pit against the Systems/3 and 32. The new FACOM V Series of computers will aim for system applications at small businesses . . . and the distributed processing market. The systems feature virtual storage, a universal operating system, data entry subsystem software, and multiprocessing.

• THERE'S A BATTLE ROYAL UNDERWAY OVER IN THE MODEM SECTOR, in case you didn't know. Racal Electronics, a British manufacturer, and Applied Digital Data Systems (ADDS) have been trading tender offers to gain control of Milgo Electronic Corporation. Milgo favors Racal, with which it has been in some joint ventures, but the seesaw battle could go either way. At last check Racal had just raised the ante and it was ADDS's turn to call.

• THE MAINFRAMERS SEEM TO HAVE HAD A GOOD BUYCENTENNIAL YEAR, led, naturally, by IBM, which posted revenue gains of 13% last year and earnings gains of 20%. IBM's net earnings for the year were $2.4 billion on revenues of $16.3 billion. Sperry Rand Corporation's revenues of $3.3 billion produced earnings of $150 million, up 4.4% and 6.6% respectively. The company reported that its computer revenues and income were up, but that overseas losses countered them. Honeywell reported that its Information Systems revenues, including CII-Honeywell Bull on a pro forma consolidated basis, were $1.4 billion in 1976 (over $1.3 billion in 1975) and its pro forma operating profit was $117 million (over $111 million). Honeywell Inc.'s overall revenues were $2.5 billion for the year with a net income of $113 million.

Burroughs almost hit the $2 billion mark in its 1976 revenues, which came in at $1.9 billion and produced net earnings of $186 million. Earnings were up 13% from 1975, revenues up 12%. NCR posted net 1976 earnings of $96 million, up 32% from 1975, on a 7% increase in revenues to $2.3 billion. Last but not least, Control Data posted revenues of $1.36 million and net earnings of $12.6 million in its 1976 computer businesses. Now, add them all up together and they're still shy about $5 billion in revenues and $1 billion in net income from AT&T's 1976 highs of $32.8 billion in revenues and $3.8 billion in earnings. Ma Bell's revenue and profit gains outpaced even mighty IBM.

• CONTROL DATA'S GOING NATIONWIDE IN THE FIXIT BUSINESS, having announced the availability of nationwide equipment maintenance through Syntronic, a subsidiary.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" FEBRUARY 11, 1977 • VOL.12,NO.15 P.J.McGOVERN,PUBLISHER

KEY-TO-DISK VENDORS QUEUE UP FOR DISTRIBUTED PROCESSING AS KEYPUNCH REPLACEMENT WANES, PROCESSING TERMINAL SHIPMENTS SOAR

In response to a premature obituary in his own paper, a young reporter by the name of Samuel Langhorn Clemens once cabled to his bosses from London: "The reports of my death are greatly exaggerated." And so it is with the good old keypunch market. By 1980, in fact, despite an installed base drop of a third . . . almost a billion dollars' worth of the workhorse machines will still be in place.

But as that keypunch base distills down to its never-say-die core, the business of replacing the devices will wane -- replacing their replacements is already in vogue. In one recent IDC sampling, for instance, less than 50% of the key-to-disks to be installed between now and 1979 would replace keypunches. The rest would bump other key-to-disks, terminals, or simply complement an existing base. In other words, it's almost time for a new generation.

And from the looks of the new products announced recently by key-to-disk vendors, that next generation will be a distributed processing one . . . which will bring changes to traditional key-to-disk marketing dynamics:

- As the key-to-diskers make their bid for source data entry/distributed processing dollars, the roll call of competitors will expand. The processing terminal makers (Datapoint, Burroughs, etc.) have already staked a strong claim in this market. Others -- minimakers, terminal suppliers, and industry-unique information appliance salesmen -- are bound to see the market's volatile growth with their own product plans in mind.

- The shift in product line emphasis from batch keypunch replacement toward transaction-oriented source data entry will cause tremors in the subindustry's makeup. Already CMC has been gobbled up by Pertec, already Inforex has foregone some of its hardware manufacturing.

- New product success may be pegged to the speed with which distributed processing catches on . . . still a variable in most analyst's books.

But the trend is there. The latest from Inforex, CMC, and Mohawk all stress communications, local programmability, and ease of operator use . . . prerequisites to any viable DDP system. With their expertise in the human-to-computer interface, the key-to-disk companies may be well placed to bring computing power to the people in the form of distributed processing.

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The new product announcements are reviewed below in chronological order. Entrex is absent . . . but the company preceded its rivals with its 600 Series of remote processors announced almost a year ago (EDP/IR, April 21, 1976). The others:

CMC's "Dream Machine" . . .

. . . otherwise known as the XL40 Distributed KeyProcessing System, was announced last December. ("DREAMs" are made of Data Retrieval, Entry, and Management, according to CMC.) A basic system, at $23,400 ($450/month), would include:

+ 64KB of memory, expandable to 128KB
+ 16-bit processor with bus design
+ Keystation controller (capacity to 7 stations)
+ 4.4MB of disk expandable to 35.2MB, tape capability
+ COBOL software subset
+ Bisynchronous communications now, SDLC later

The key to making the XL40 a "dream machine" is its software. This includes the XL/OS operating system, support software, and a COBOL-compatible user language. Disk and memory allocation are dynamic; display formats can be varied; and editing features programmed in by the user.

Inforex's System 7000 . . .

. . . with its use of OEM components, marks a significant change in the company's manufacturing posture. As hardware manufacturing costs drop as a percentage of total system life-cycle, value added in software and service can yield a higher return on investment, contends Inforex. And higher hardware costs can be offset by shorter lead times, greater marketing emphasis, and better cash flow. The System 700 itself features:

+ Standalone (1 terminal) or clustered (8 terminal) versions
+ Minicomputer CPU, up to 128KB main memory
+ Virtual storage, COBOL 74 (interactive) subset
+ Mass storage (up to 4 units) in 10MB disk or 256KB diskette
+ File access and data entry optimization; various printers
+ Bisynchronous communications; tape drive capability

A representative standalone unit would cost $13,350 ($320/month); a "master" processor with three satellite terminals, disk, tape, and printer five times that.

Mohawk's Series 21 . . .

. . . is considered by the company its most important new product since its key-to-tape system announced 12 years ago. Initially it will come in two models -- a data entry system and an application processing system -- and include:

+ Controller/console with up to 64KB of memory
+ 1 to 4 keystations per system; Bisynch or SDLC communications
+ 1 to 4 diskettes (243KB); a 2.5MB disk
+ Two-tiered software, starting with data entry software and extending to a COBOL-like programming language (MOBOL)

A typical four-station data entry system would cost $18,900 or $462 per month -- multiple unit configurations will then cost about $100/month per keystation.

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KEY-TO-DISK VERSUS PROCESSING TERMINALS: INSTALLED BASE AND SHIPMENTS

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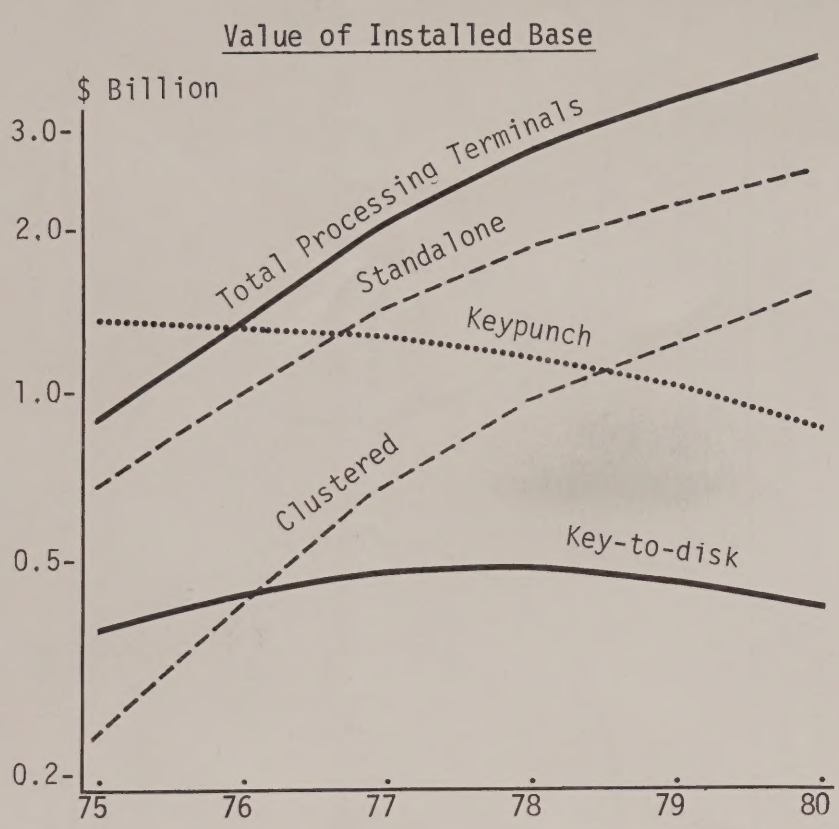

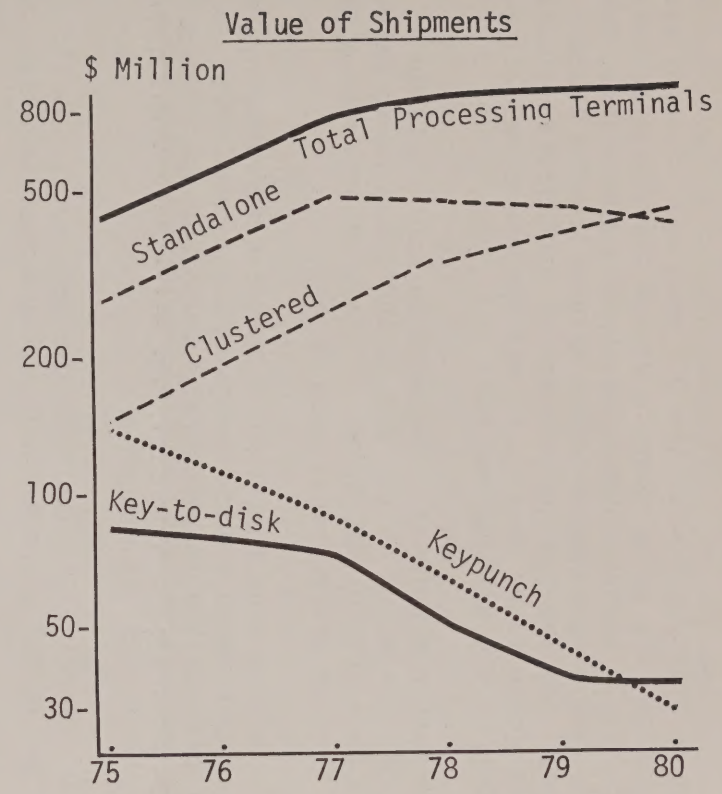

Note: Processing terminals can come either standalone or clustered. Prime examples of standalone types are Burroughs' TC Series, Sycor's 340 and 350, Datapoint's 1100 and some 2200s, and IBM's 377X terminals. Examples of clustered processing terminals are Raytheon's PTS-100, some Datapoint 2200s, and those Four-Phase IV-40s and IV-70s that aren't specifically configured as key-to-disks.

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DDP: The village market

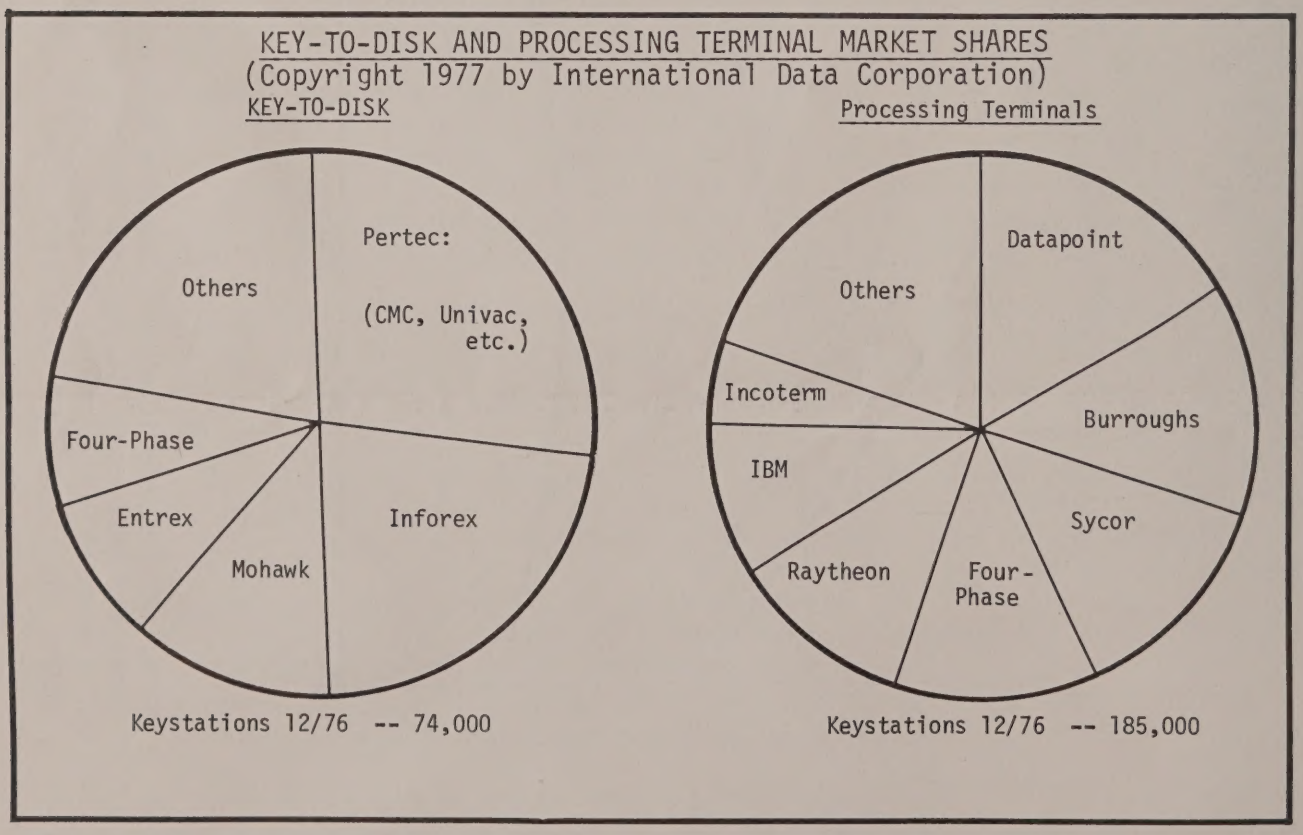
Key-to-disk vendors striding toward the DDP mart will find others there already hawking their wares. The prime vendors so far are the processing terminal makers. At yearend 1976, Datapoint, Burroughs, Sycor, Four-Phase, Raytheon, and others already had 185,000 processing terminal keystations in place. Few are "distributed processing" systems per se, but enough distributed capabilities are offered to make strict definitions moot . . . and equipment selection as clamorous as Saturday morning at the village market.

Further, the processing terminals -- standalone and clustered -- will triple in number of keystations installed by the end of 1980, and their value will jump almost as much. It's such growth that makes DDP look so attractive to other vendors -- whether they're data entry specialists or not.

(Data 100, for instance, long the king of independent remote-batch terminal makers, is planning a major product line reemphasis onto DDP. Its new Model 82 -- a multifunction display unit with processor, diskette, and communications -- is the first of a line that will evolve from key entry and file inquiry to full-scale remote distributed data processing.)

That terminals in general will take over the data entry function is borne out by a recent IDC study of users' plans between now and yearend 1978:

- Within the sample, 20% of the keypunches to be deleted between now and YE 1978 will go to terminals, 36% to key-to-disks, 20% to IBM 3740s.
- 62% of the key-to-tape devices to be replaced will be bumped by terminals, 15% will come under the key-to-disk axe, 10% will lose to 3740s.



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- Of key-to-disks being deleted, 11% will fall to terminals. The rest will be replaced by other key-to-disks or deleted without replacement.

- Of the terminals to be deleted, 75% will go to other terminals, 5% to other DE devices; the number of terminals to be added by the users in the sample outweighed the terminals deleted by eight to one.

IBM's share of the processing terminal market -- primarily through the 3740, 3735, and, to a lesser extent, the 3790 -- is currently less than 10%. But its participation in the DDP could increase dramatically as its industry-specific terminals gain headway . . . and, perhaps, as the Series/1 mini finds new homes.

Key-to-disk risk

Will the key-to-disk vendors make the transition? Probably. They have already weathered some severe storms, and profit pictures have finally brightened. And, if market research done by Inforex in developing its System 7000 is right, 80% of the processing in DDP applications will center on data entry, validation, transfer. Even if this number is high, it's enough to offer encouragement to data entry specialists. Such seemingly mundane fortes as cursor control, record add/delete, and automatic logging . . . will all come in good stead.

Will users make the transition? Eventually. The growth in terminal sales alone indicates it . . . as does the increased use of communications with key-to-disks being shipped now. Inforex says 35% of its systems are currently going out with communications capabilities, and IDC estimates that by 1979 almost 15% of the key-to-disk installed base will be operating remotely.

And that's just key-to-disk. Actual distributed processing systems will pull users away from simply data entry markets . . . and, in fact, if IDC studies are accurate, a goodly portion of the DDP market will represent new, net growth. The key-to-disk vendors will be finding fresh faces for their fresh systems . . . .

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BURROUGHS TACKS ON TO EITHER END OF ITS PRODUCT LINE;
B 800s AND B 7800s TO OFFER DOUBLE THE POWER OF THEIR PREDECESSORS

A little over a year from the first announcement that a "new" generation of computers was in the works at Burroughs, the Detroit mainframer patted what looks to be the last of its major Series 800 bricks in place. Announcing first a small system that covers the ground between the B 80 and the recently announced B 1800, the company then announced the most powerful system it's ever built. And from the smallest of B 80s to the largest 8-processor 7800, the computers in Burroughs' new line have some common traits:

- The new systems update the "700s" in circuitry and memory and hone the architectural edge that has characterized Burroughs computers since the B 5000 announcement in 1961.

- The company's Master Control Program and use of software "interpreters" to implement the operating system spans the entire line; systems are upward compatible with others in both the 800 and 700 families.

- Datacomm and I/O are handled through separate processors . . . in fact the distribution of processing functions this way -- and system configuration through mix-and-match -- seem to be a Burroughs' norm.

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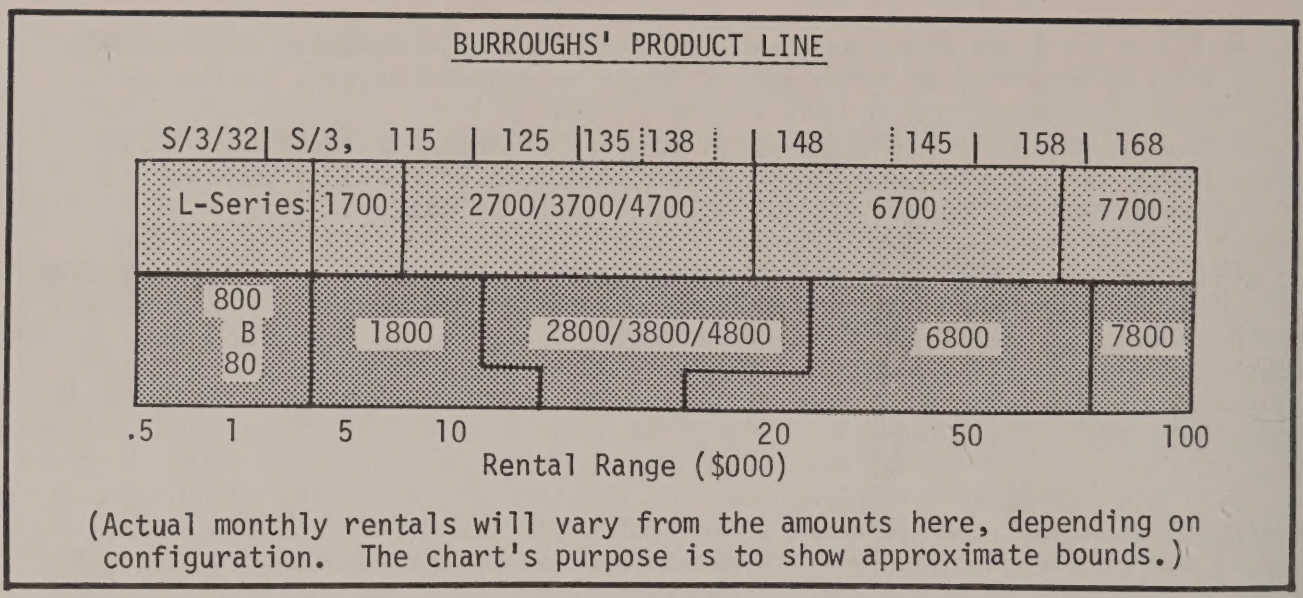

(Actual monthly rentals will vary from the amounts here, depending on configuration. The chart's purpose is to show approximate bounds.)

An outline of Burroughs' product line compared to IBM's is shown above. Typical rentals are elusive at best, so some sweeping generalizations have been made. Actual rental values are less important that positioning -- and even then much depends on exactly how users decide to use the new systems. But note that the 6800 extends down into the 2800/3800/4800 class . . . just as the 1800 appears to extend upward. Whether users will opt for a small big system or big small system -- or meet their needs with a midrange system -- remains to be seen.

From the B 800 . . .

The B 800s, says Burroughs, provide twice the processing power of B 700s and offer memory up to 131KB. Also announced were three new disk subsystems: an entry level disk cartridge system, a 9.4-to-37.6 megabyte fixed disk system, and a 521MB removable pack disk system. Other peripherals are also available.

With the B 800 come the software systems announced with the B 80. These include operating software (Master Control Program), Data Control System software, high-level language compilers, interpreters, and the Business Management System application programs. An entry level B 800, says Burroughs, would lease for just over $1,000 a month; a larger one would go for $1,500.

. . . to the B 7800

At the other end are the 7800s, introduced on January 31. Object code compatible with 6700s and 7700s -- as well as 6800s -- these new systems can provide up to 50 times the processing capability of a threshhold 6800 system, contends the company. There are two basic models -- one with single CPU and I/O processors, one with dual processors -- but up to eight processors can be hooked together.

A memory subsystem provides up to 6.3MB of storage with an effective access rate of 50 nanoseconds per byte, and a 12KB high-speed buffer virtually eliminates the time the CPU must wait for code to be transferred from memory. Monthly leases on the CPUs start at $50,000 (1.5MB) and run to almost $100,000 (6.3MB).

Whether or not the "800s" are a new generation of computers -- or if the concept is still valid -- is moot. Users have a new round of machines to play with. And, like the "700s" did, Burroughs' "800s" are bound to continue evolving.

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SPERRY UNIVAC ADDS A NEW SMALL SYSTEM TO ITS SERIES 90; FLOPPY DISK, 16K CHIPS, AND 90/30 UPGRADABILITY FEATURED

By sort of "throttling down" its popular 90/30 small computer, Sperry Univac this week added one more product to its line . . . and continued to plow the fertile IBM System/3 customer base. In addition, the company's own 9200 and 9300 users should find the new system attractive.

The 90/25, as it is called, is basically a 90/30 -- or at least it can be field upgraded to one and its CPU will apparently come off the same production line -- but with new memory technology and peripherals. Namely, it will use 16K chips for memory and flexible diskettes for data entry. It will also include:

- Memory from 64KB to 131KB; CPU cycle time about 30% slower than a 90/30.
- Two versions, one with card I/O and one with floppy disk I/O, and OS/3 the 90/30 operating system.
- A new 300 line-per-minute printer, new 33.1MB disk system, and communications (Sperry expects almost 65% of the units to utilize datacomm).
- Prices 10%-25% less than the 90/30, with minimum systems renting in the vicinity of $3,500 a month.

The field upgradable version of the 90/30, dubbed the 90/30B, will offer all the functions and peripherals of the 90/30 in addition to the 90/25's features. Its main memory can be expanded to half a million bytes.

Sperry doesn't expect the 90/25 to affect its 90/30 sales and, in fact, expects it to increase them by expanding the company's overall small systems base. Since all the models are pretty much the same beast -- the 90/25, 90/30, and 90/30B -- which one goes out the door should matter little. Besides, the firm's business plan requires only modest sales for the 90/25 to be a profit maker.

A bigger concern is what to do with 90/30 users who are beginning to think about upgrading. Sperry admits that options are open to it -- slap OS/3 onto the 90/60 or VS9 onto the 90/30, introduce a new model entirely, etc. -- and that the company hasn't yet decided which way to tack. But it should be fairly soon.

COLD ENOUGH FOR YOU?

After Sperry finished filling in EDP/IR on the wonders of the 90/25, a subject came up that's on everyone's frostbitten lips this winter: The weather. (Pronounced "Weathuh" in EDP/IR's native locale.) No Sperry factories have yet shut down, said the company, but sales could be affected in other ways, as:

- Management time at customer installations is devoted to more pressing problems than what kind of computer to get when, and
- Capital expenditures are diverted to filling energy needs -- either through rising fuel costs or energy conservation equipment.

All of which must leave all the mainframers -- except one -- wondering if maybe being in the industrial controls business as well as the computer business might pay off one of these cold, wintry days.

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• NCR ADDED FIFTY TO ITS 8200 MINICOMPUTER . . . coming up with the NCR 8250, a general-purpose mini that can be used either as a freestanding interactive multiprogramming system or a communications-oriented processor in a network. The system offers up to 80MB is disk storage, memory to 128KB, and the automatic battery protection NCR uses with its new POS systems. Line printers, tapes, floppies, and all the other niceties appropriate for a small system can be attached. The system's operating software is COBOL 74-oriented and comes with a module that provides for concurrent remote-batch communications capabilities. A basic system will cost $42,420 or rent for $1,205 on a five-year agreement. An expanded configuration -- 128KB CPU, 40MB of disk, 4 visual display units -- will cost $111K or 3,100/month. The 8250 will run applications software sold for the 8200.

• HONEYWELL HAS BEGUN GETTING ACQUAINTED WITH ITS XEROX USERS . . . and in a show of good faith is providing them with some extended capabilities on their XDS systems. The enhancements include memory subsystems (add-on) for the Sigma 6, 7, and 9; dual processor options for the Sigma 6 and 7; virtual memory for the Sigma 5; and new removable disk storage and mag tape for the Sigma and Series 500 systems. Having assimilated another mainframer's base once already in this decade, the company should have some definite ideas on customer grooming . . . .

• DECISION DATA HAS A NEW SYSTEM/3 PRINTER, the DD 6615, a 1500 line-per-minute replacement for IBM 5203 and 1403 printers used with System/3s. Says, Decision Data, "users of the 1403-N1, presently the fastest System/3 printer available, can increase their throughput potential by 36% with the 6615. While enjoying this increase, many users will be able to reduce their monthly charges by $104." The new printer utilizes chain-train technology, featuring a reversible band which can contain a different character set on each side.

• MEMOREX HAS ANNOUNCED AN ENHANCED 1377 DISPLAY STATION, the Model 4, which offers System/3 compatibility, improved character size, and enlarged cursor control. The 1377 Model 4 is designed as a replacement for the IBM 3277-2 and can be used to enter and display data on System/3s, 360s, 370s, and 3790s. First customer shipments have already begun, two-year lease prices start at $110/month.

• SYCOR IS EXPANDING ITS OVERSEAS THRUST INTO DDP, having announced distribution agreements with a European group consisting of CMC subsidiaries in England, France, and Germany. The European CMC companies will distribute Sycor 400 products through Europe, Africa, and the Middle East. Sycor's 200 and 500 series systems are distributed by Olivetti. So, in one part of the globe, anyway, the brewing competition between key-to-disk DEers and the terminal makers has been forestalled -- through cooperation, rather than competition.

• QUANTOR HAS A NEW COM SYSTEM FOR NONINITIATES, the Q-101 recorder/processor and Q-203 duplicator priced at less than $60,000 . . . which, hopes the California firm, will entice new users into the computer-output-microfilm fold. The new system, says Quantor, costs less because it offers less flexibility than the company's higher-priced recorder, the Q-105.

• NCR HAS ADDED A MATRIX PRINTER TO ITS 7200 KEY-TO-CASSETTE TERMINAL. The new printer operates at 173 cps, costs $6,590 or $235 a month.

• SIPHON OFF THAT LAST CIPHER, PLEASE . . . namely the extra zero that had us pricing a large Sperry BC/7 at $17,000/month rental. It should be $1,700. Danke.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" FEBRUARY 28, 1977 • VOL.12,NO.16 P.J.McGOVERN,PUBLISHER

Outside forces

IBM GAINS DIRECTED VERDICT IN CALCOMP TRIAL AS LEGAL AND REGULATORY ISSUES WASH OVER THE INDUSTRY

For some time prior to the commencement of this trial I held the view that the plaintiff had, at best, a very thin case for antitrust relief. I realized the importance of this case to the client, the tremendous expenditure of time and effort which has gone into the preparation and the potential wide ranging effect of any decision on the merits.

I decided, therefore, to be most liberal in permitting the plaintiff to have the fullest opportunity to present its evidence and to prove a case, if indeed one could be proved.

A very considerable amount of testimony and documentary evidence has been admitted over strenuous objection. Certainly, the rules of admissibility of evidence have been as liberally construed in this case as any of which I am aware. Plaintiff was permitted, almost without restraint, to put into the evidentiary record every fact and instrument presented.

And now the moment of truth is here.

-- Judge Ray McNichols, 2/15/77

We are living in a highly political economy . . . . The Bell legislation can be likened to killing a fly with a sledgehammer.

-- Rep. Timothy E. Wirth, 2/23/77

Once again computer industry soothsayers find themselves delving into the more arcane corners of their industry in search of omens . . . as actions by a West Coast judge and a Washington congressman bring the legal and regulatory forces affecting the computer industry into the limelight.

Judge Ray McNichols started -- and startled -- it off in Los Angeles by directing a verdict against CalComp in its $300 million antitrust suit against IBM. McNichols' decision wrested the trial's outcome from a 12-person jury and came before the Armonk pinstripers had a chance to present their side of the case. He said, "I am satisfied that the plaintiff has failed to make out a prima facie case for violation of the statutory provisions relied upon."

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IBM ANTITRUST CHRONOLOGY

Plaintiff	Filed	Trial	Appeal	Concl*	$ Damages Asked**	Dam./settle received
Control Data	12/68			1/73	3 x damages, estimated over $7B	$100M over 10 years SBC sold to for $16M
DPF&G	1/69			8/70	3 x $351.5M; $1B punitive	Over $500,000 + better terms on debts to IBM
Department of Justice	1/69	5/75			Divestiture	
ADR/Programmatics	4/69			8/70	3 x $301M; $3.5B rebates for customers	$1.4M and $600K IBM business over 6 yrs
VIP Systems	4/70			2/76	3 x $15M	Confidential
VIP	6/70			8/70	3 x damages (not estimated)	$300K + write-off of $300K owed IBM
Greyhound	9/70	6/72 Dismiss	11/72 Pending		3 x damages (not estimated)	
Symbolic Control	9/71	12/75 Dismiss			3 x damages (not specified)	
Telex	1/72	4/73 won	10/73 lost	10/75	3 x $361M (awarded $241M first round)	$18.5M counterclaim released by IBM
Levin	7/72				3 x unspecified dam.	
CalComp	10/73	11/76 lost	2/77		3 x estimated $100M	
Transamerica	12/73	(6/77)			3 x $50M	
Hudson General	12/73	(6/77)			3 x $28M or more	
Memorex	12/73	(6/77)			3 x 1.05B	
Marshall Industries	12/73			9/75	3 x $36M	$800,000 from IBM
Forro Precision	8/74	(6/77)			3 x $12M	
DPF	9/74				3 x $15M	
Memory Technology	11/74			3/76	3 x $56M	$50,000
Sanders	1/75			1/77	3 x $85M	$10M in IBM purchase of technology

* All cases concluded to date via settlement with IBM.
** Many suits also ask(ed) for divestiture and other relief. IBM counterclaim damages left out of $ calculations.

Two weeks later, Rep. Timothy E. Wirth (D-CO) fired a volley in another battle -- this one in Washington, D.C. -- the outcome of which will have a significant impact on the computer industry. He and twenty others introduced a joint House-Senate resolution "providing that competition is reaffirmed as the best means of serving the American consumers' telecommunications needs." The resolution is the first formal Congressional opposition to the Consumer Communications Reform Act -- the so-called "Bell Bill" -- recently reintroduced in Congress.

Although the reverberations of McNichols' verdict will continue through the appeals process -- and the final Congressional clash over the future of telecommunications is but a distant drumming at this point -- both actions have immediate effects on the attitudes and planning of industry participants. There is more to this business than semiconductor wizardry and software engineering.

The CalComp effect

CalComp will appeal, of course, so the matter is far from settled, but the judge's actions have more than simple guilty/not guilty ramifications:

- A case like CalComp versus IBM illustrates the power a single, non-elected district court judge wields. Even if he's reversed on appeal, his actions do not take place in a vacuum. Trial happenings have a way of translating into stock prices of the litigants, for instance, (Some observers attribute IBM's recent buy-up of its own stock to

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Judge McNichols' verdict.) At any rate, legal events represent significant -- but unpredictable -- forces on the computer industry.

- The growth and flux of this technology-driven industry complicates the antitrust issues. CalComp's success -- IBM monopoly or not -- seemed to be an argument against the company. Is monopolization a relative thing? And exactly how do you calculate relief in that case?

- According to post-mortem interviews, the jury was leaning in CalComp's favor when the judge handed down his verdict. At the least, the members were eager to hear IBM's side. There are questions concerning the ability of a jury of laypersons to cope with the complex legal and technical issues in a suit of this type . . . but, for that matter, there are questions about a judge's ability as well.

- IBM's success in the antitrust courts -- if viewed as court caution in the face of "structured" antitrust cases involving "relevant markets" -- hints at a prime weakness in the Sherman Act as it stands and points up the need for a Congressional mandate in this area.

Depending on how you view the relatively swift conclusion brought in private suits -- and the direction the decisions have tended -- the U.S. case against IBM becomes either more or less ludicrous. Either it's the last bastion against an on-going monopolist . . . or a waste of government and corporate resources, so much "good money after bad."

CalComp's President, Lester Kilpatrick, for instance, is still optimistic about the U.S. case. "The government may be slow about it, but the lawyers are reading their case into the record." Still, to an outside observer, the New York trial's pace and entropy seem almost overwhelming. Capitol Hill looks more and more like the court of final resort.

An anti-Bell bill

The computer/communications imbroglio has already migrated to Capitol Hill. Wirth's four-page resolution, which pretty much follows the FCC party line, refutes point by point AT&T's arguments in the Bell Bill. Behind all the whereases and wherefores, the resolution covers eight main points:

+ Competition should be the cornerstone of a rewritten Communications Act.

+ Contrary to Bell's arguments, Congress never intended a total monopoly of telecommunications, and its 1934 legislation permits competition.

+ The "first generation" telecommunications plant is in place and is the best in the world. Basic services have been achieved.

+ The FCC and the Justice Department have affirmed the notion of competition in telecommunications, and the courts have upheld them.

+ So far, what limited competition has been allowed by the FCC has demonstrably benefited consumers.

+ Even under a competitive structure, the Bell System has a huge and growing share of the market.

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BERNIE NASH'S SHORT COURSE ON GLACIOLOGY

As counsel for the Hart Subcommittee on Antitrust and soon-to-be-freelance antitrust lawyer, Bernard Nash is well-suited to examine the forces that mire the wheels of justice in antitrust trials. At the recent Washington Caucus of the Computer and Communications Industry Association he held forth on the subject.

There is no uniformity of causes or solutions to the problem, but a "worst case," he points out, occurs when the government is plaintiff and the case based "structure." (Mergers and price-fixing are much easier to handle.) Add to that the problem of too few, and too few qualified judges and the problem swells.

Nash cites some problems that are specific to government cases:

- Millions of dollars often ride on the outcome. Knowledge of this affects judges and prosecutors . . . and prompts defendants to amass as much legal horsepower as possible.

- Delay serves the defendants . . . and doesn't seriously affect the prosecutors, as in private cases, where other revenues can be impinged.

- The quality of personnel is disparate. Government lawyers are very bright, but not well versed in courtroom tactics. Government presentations tend to respond to the defendant's rather than take the attack.

Personnel problems can be traced to salaries and the bureaucracy -- to reward a trial lawyer with a high civil service rating, for instance, it's necessary to take him out of the courtroom and make him an administrator. Many lawyers see government work as a stepping stone to more lucrative private careers.

But perhaps the biggest fly in the ointment is the government's lack of a businessman's point of view. Time is not of the essence. No one makes a calculated risk analysis -- weighing the chance of a less complete case against the benefits of quicker redress -- and conservatism is the watchword.

The state of the law is another problem. Judges have been interpreting the Sherman Act to require that intent -- as shown by predatory actions, perhaps -- be part of the plaintiff's proof. The law adds to the government's caution.

Finally, the relief asked for in monopoly "structure" cases would have presiding judges sunder thriving business organisms. Employees and shareholders stand to be radically affected by a single pronouncement . . . and Nash suggests that the thought can be scary for judges well aware of their own fallibility. Hence the concern in maintaining a proper "record" at the district court level. ("If the Appeals Court would go right after this case, I would think that we have created a record that is going to give them an opportunity ... to make a very definitive decision in the antitrust law," said McNichols after his edict.)

The answer? More and better qualified judges, of course, and a different attitude on the part of the government team. (Nash hinted that in the DOJ case against AT&T some improvements in the discovery process will be apparent.) The ultimate resolution, however, will have to come from the lawmakers. Meanwhile, the government trustbusters plod on . . . and, as of today, without a leader. Donald Baker, the head of the DOJ's Antitrust Division, has been hustled out of office by the Carter administration . . . leaving more question marks than ever.

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THE POLITICS OF POLITICS

If Representative Timothy E. Wirth (D-CO) had a message for the company execs to whom he spoke at last week's CCIA Washington Caucus, it was this: business and politics are bedfellows. The government is pervasive, better get used to it.

A good example of the byzantine workings of the nation's most powerful deliberative body can be found in the "Bell Bill" and Wirth's countering resolution. When asked by the audience when he expected his resolution to come to a vote, Wirth answered, "never." The resolution would never make it to the floor. But for that matter, neither would the Bell Bill.

Instead, he explained, the resolution is an educational tool. Most members of Congress -- with budgets, Angola, and energy crises to worry about -- are unfamiliar with the telecommunications struggle. It was this Congressional unawareness that accounted for much of the backing of the 1976 version of the Bell Bill. Many members simply accepted AT&T arguments at face value, signed at the request of local telcos, or acted just to get the lobbyists "off their backs." (AT&T lobbying for the bill surpassed $2 million, says Wirth.)

With the opposition solidified behind the resolution, the stage is set for the idealogical and political battle that should serve to educate Congress about the telecommunications industry. As competitive arguments fly across Congressional podiums, the issues will become more familiar. That Congress is already more conversant with them, says Wirth, is supported by the fact that this year's Bell Bill has garnered only 36 sponsors so far -- less than a fifth of 1976's.

The trick is not to let up. With the pro and con lobbyists standing each other off, the House Subcommittee on Communications -- on which Wirth serves and Lionel Van Deerlin (D-CA) heads -- will be able to rewrite the law without immense one-sided pressures.

What prevents the Subcommittee's rewritten legislation from being crippled by amendments or otherwise altered once it's out of the hands of Wirth and company? "We line up the votes beforehand," he says, "the legislation won't leave the Subcommittee until we know exactly what will happen to it. The compromises are worked out ahead of time."

"Besides," he adds, "Congress knows there are committees and then there are committees. Some do their homework and Congress doesn't meddle with their legislation. Others don't. Ours is one of the former."

+ Contrary to Bell claims, the evidence doesn't support contentions that residential rates will go up as a result of competition.

+ There has been no significant evidence that interconnection to the public network causes harm to the network.

As a result, says the resolution, any rewrite of the Communications Act of 1934 should establish competition in the telecommunications industry "except where there is clear and convincing evidence that such competition would produce unreasonably higher costs or poorer service for the American consuming public." Such a rewrite -- following hearings to begin soon in the areas of common carriers, international carriers, cable TV, frequency allocation, administration, and privacy -- could come as early as the next Congress.

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U.S. versus IBM

Soon it will be two years since the trial started. The government's presentation is now nearing completion, with estimates putting the end of it before mid-year. The "educational allowance" and "standards" sections of the "IBM conduct" portion have been completed -- with some effectiveness, according to courtroom observers -- and the "peripherals" section is well underway. IBM's side of the case might take a year, the judge's decision another.

Ironically, the "peripherals" section of the case began on the same day as the CalComp trial and covers many of the same issues (as well as those in the Telex case and the West Coast suits yet to start). But the size of the U.S. case -- and and perhaps the natures of the two judges involved -- should preclude any serious impact of the McNichols' verdict on the New York trial. The acceptance or rejection of McNichols' reasoning at the appellate level, however, might prove a harbinger of things to come in the U.S. trial.

Since the last EDP/IR review of the case (EDP/IR,Sep.30,1976), the DOJ lawyers have raised these points:

- At least one independent peripherals maker (Memorex) had problems raising capital as a result of the 2319 disk and ETP and FTP leasing plans.

- School after school was subject to IBM pressure for acquisition of its computers by IBM's arbitrary wielding of educational allowances.

- The 360/67 and other "fighting machines" were marketed with less than the usual regard to cost in order to maintain "gold chip" accounts.

Although the real substance of the U.S. case against the Armonk mainframer will rest on the testimony of witnesses and the wording of documents entered into evidence . . . as usual, the "meta" legal issues stole the show. In addition to the document-entering procedures reported last fall:

- The court took a Christmas trip to Florida to interview an IBM witness. Despite the junket, the witness's testimony was not considered all that useful -- nor his ability to testify in New York all that questionable.

- The Misconduct charges hurled early in the case by lawyers from both sides remain unresolved. Both sides have promised stipulations in the matter but have yet to present them to the judge.

- IBM's continual objection to "privileged" documents reviewed by a board of "special masters" and deemed by them admissable for evidence riled Judge Edelstein to the point that he said he would rule on their admissibility himself. There are 14,000 of these documents.

- The animosity between all parties involved is thinly veiled. IBM trial captain Thomas Barr seems almost to relish being a "bad guy," and the resentment of government lawyers is undisguised. The Judge is relatively impartial . . . railing at both sides from time to time.

- Witnesses (Memorex) claim that IBM lawyers have pressured them to mitigate testimony to avoid lengthy and grueling cross-examination. Another company (Itel) has complained of harassment in discovery proceedings.

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In a way, the actions of all participants resemble those of a shadow play. The judge is careful to enter data into evidence and tries to keep his anger at the lawyers from looking too prejudicial; yet IBM draws enough Edelstein ire into the record that observers wonder if it isn't partly to influence later readers; the DOJ reads as many documents as it can into the record -- despite their varying clarity and usefulness. In other words, even as the trial lurches toward its third year, everyone realizes that it's just beginning.

The others

If the U.S. trial is relatively undisturbed by the CalComp decision, other cases are not. The fallout from McNichols' decision:

- Memorex and Transamerica are still eager for trial . . . with different cases, they say, that look at heretofore unexamined IBM profit margins.
- The $18.9 million IBM trade secret countersuit against CalComp is still alive, but probably won't come to trial until after CalComp's appeal.
- Hudson General, of the remaining West Coast litigants, would prefer to wait for the appellate review: it's law firm is the same as CalComp's.

In fact, it's likely none of the cases will go to trial before McNichols' decision is reviewed . . . he's suggested it might be better for the plaintiffs if he's removed from their cases (except perhaps for pretrial work). It's likely that successor judges will want to wait for an appellate decision before rushing into the breach. So, as it often goes in these judicial affairs, everything gets set back a notch. Meanwhile the computer industry rushes on toward a year of exciting growth . . . with judicial and regulatory affairs still just a tug on its sleeve. But the industry would do well to heed that tug.

+ + + +

NEW IMAGE AT THE CCIA

The Computer and Communications Industry Association, once known as the CIA to the confusion of outsiders, has a new image. It may have started when the association moved from California to Washington, D.C., when the new management took over, or when the name change took place. At any rate, the association is no longer the IBM-baiter it once was . . . having called for an out-of-court settlement in the U.S. suit and come to terms with Satellite Business Systems.

To be sure, the CCIA still vents its anger at what it feels are inequities in the status quo . . . but its actions and positions reflect a concern for the industry as a whole, not simply the gripes of IBM have-nots.

The Washington Caucus is a good example. Pulling together Congressmen of both parties, industry executives from most of the major independents, policy-making regulators, and a few press representatives, it had a decidedly forward look. The issues raised were not of the "look what they've done to us" variety, but the "what can we do" kind. Association members were there to learn to be more effective in unfamiliar forums . . . not to rail at bureaucrats.

Trade associations -- as Congressman Wirth and others pointed out -- are one of the few ways a business group can concentrate enough money and attention to get its case before the power brokers. To be heard is easy, to be listened to takes credibility . . . all part of the new image the CCIA is building.

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• CONGRESS WILL SPEAK AT DATACOMM 77, or at least keynoter Lionel Van Deerlin will "deliver a major address on new congressional perspectives of legislative issues stemming from the merger between computers and communications." Representative Van Deerling (D-CA) heads the House Subcommittee on Communications and will be at the helm as that group attempts to overhaul the Communications Act of 1934. The rewrite of the legislation comes in the wake of the Bell Bill, the Dataspeed 40/4 controversy, and the reopened FCC Computer Inquiry. All these topics will be covered at Datacomm 77, a three-day show opening in Washington on March 9.

• ICL EXPECTS ORDERS WORTH OVER £100 MILLION BY 1980 for its ICL System Ten 220 Series of small computers announced recently. The 220s are a follow-on product to the Singer System-10 110 Series of computers, 4,000 of which are installed around the world, according to ICL figures. The British mainframer took over the non-U.S. base of Singer equipment when that company left the computer business in 1975.

The 220s are CRT-controlled, disk-based, real-time computers with a cycle time 33% lower than their predecessors and disk access speeds 50% higher. A basic 220, says ICL, will cost 35% less than one of ICL's 2903/20s. Memory will range from 20,000 to 160,000 characters. A variety of peripherals and software packages is also available. First customer shipments are planned for April, out of ICL's U.S. plant in Utica, New York. U.K. production will begin this summer.

• AMDAHL HAS BEEFED UP ITS 470/V6 BY 5% TO 15%, says the company. The new model features an expanded high-speed buffer -- from 16KB to 32KB -- that accounts for the increase in performance. Systems with the new buffer will be designated 470/V6-II computers and cost 3% to 5% more than an elder 470/V6. Field upgrades for systems installed before the first availability of factory-installed buffers will cost $150,000.

Its product line is not all that Amdahl is expanding: Its production operation is growing, too. Amdahl says it can now ship four systems a month, and Amdahl and Fujitsu Limited of Japan have agreed in principle to develop new products "which go beyond the current state-of-the-art computer systems." In addition, the company has established its own leasing operation -- the Library of Congress is one of its first customers -- with a limited number of its 1977 production earmarked for leasing. Amdahl finished 1976 with revenues of almost $100 million and net income of $23 million.

• THE X3 I/O INTERFACE STANDARD IS OUT OF COMMITTEE AFTER SEVEN YEARS and one step closer to approval by the National Bureau of Standards' full ANSI board. The X3 would govern I/O connection and is based on IBM 360/370 interfaces. Several mainframers opposed it (IBM is reserving judgement), but many of the independent peripherals makers supported it. When the standard is finally accepted it will be written into federal supply schedules . . . making it harder for a mainframer to change the interface without impacting his own customer base. Contentions that the standard is based on outmoded technology were refuted by Dr. Gene Amdahl, who designed the original I/O interface and uses it in his company's product.

• OVER 1,500 IBM 3600 FINANCE COMMUNICATION SYSTEM teller and platform banking terminals will go into The Chase Manhattan's COMNETS retail banking system. The system will automate banking at 200 branch banks throughout New York State and provide for selected financial and non-financial data capture in the field.

• IN RE MILGO: RACAL TOOK THE POT, ADDS LOST. But what a tussle!

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EDP industry report

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"THE GRAY SHEET" MARCH 11, 1977 • VOL.12,NO.17 P.J.McGOVERN,PUBLISHER

1977 EDP USER SPENDING TO CRACK $35 BILLION MARK ON CONTINUED DEMAND FOR HARDWARE AND OUTSIDE SERVICES

Early indications are signalling a "return to basics" in EDP spending patterns for 1977, as users lay out more new dollars for hardware than for any other portion of the total EDP budget. Outside Services and Software will consume an additional 2.5% of this year's budgets (17% total), while salaries will garner 3% less. Furthermore, IDC's recently released Annual User Spending Survey shows that most of 1977's $5 billion EDP budget increase will be in "real" dollars. Inflationary pressures that have been rampant in the past few years are easing, possibly contributing to the smallest percentage increase in DP salaries since the late '60s.

Overall, EDP spending in 1977 will increase 16% over last year. Hardware and outside services will increase 19% each, while salaries will be up only 9%. Mainframes, autotransaction appliances, minicomputers, data communication and DDP equipment, and remote services will experience particularly brisk sales. Behind this bright spending picture -- foreshadowed by a preliminary analysis published in December (EDP/IR,Dec.15,1976) -- are some noteworthy trends:

+ CPU utilization continues at a high level. Increased workloads in 1977 should result in the acquisition of more hardware, especially mainframe upgrades.

+ The 1960's trend toward centralization is now reversing; many large companies are decentralizing through distributed processing, fueling demands for terminals, datacomm, minis, and transmission services.

+ New price/performance parameters (initiated by IBM's 370/138 and 148) are accelerating medium-scale mainframe changes.

+ User sophistication -- and mainframer pricing policy -- is leading to more outright purchase of equipment. The "not-invented here" syndrome is disappearing as users are realizing savings in "canned software."

Although EDP budgets are burgeoning in inverse proportion to user size, the spending at large-scale sites is undergoing a strong revival (led by IBM's 370/168 and Amdahl's 470/V6). Consolidation efforts are diminishing as computer equipment is being pressed into double-shift duty, and EDP-hungry applications are coming on-line. All in all, 1977 prospects are sunny . . . the Winter of '77 doesn't seem to have frosted user plans to any significant degree.

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From inside the pie

User spending patterns -- distribution and growth -- are shown below. To determine those patterns, IDC continually monitors a specially structured model of the computer industry and then extrapolates results to the real world. The model consists of 63 large-scale users from the Fortune 500 -- the leading-edge data processors and representative of 35% of the installed base -- and 65 medium-scale users -- representing 55% of the installed base and the "breadbasket" of the computer industry. Survey results are corroborated by spending data that surfaces in other IDC reports and user interviews.

(Spending at small and first time sites is factored into IDC's figures -- but not spending from non-EDP department budgets. Thus, as distributed processing expands into line operating budgets, salaries will become a smaller portion of EDP-room-only budgets.)

Within the various sectors of the computer industry:

- PCM growth is slowing. Just two years ago, the growth rate for spending on independent peripherals was almost 30%; now it's down to a 1977 forecast of 20%. And spending on third-party leasing -- though over $1 billion a year since 1976 -- is lagging other acquisition methods.

- Spending growth for rentals and leasing from systems manufacturers, which had been forecast at 15% for 1976 but came in at 5%, will be more like 9% in 1977. Still, the category will top $5 billion this year.

- Overall spending for general-purpose computers -- including all acquisition modes -- will top $10 billion, up 12% from 1976.

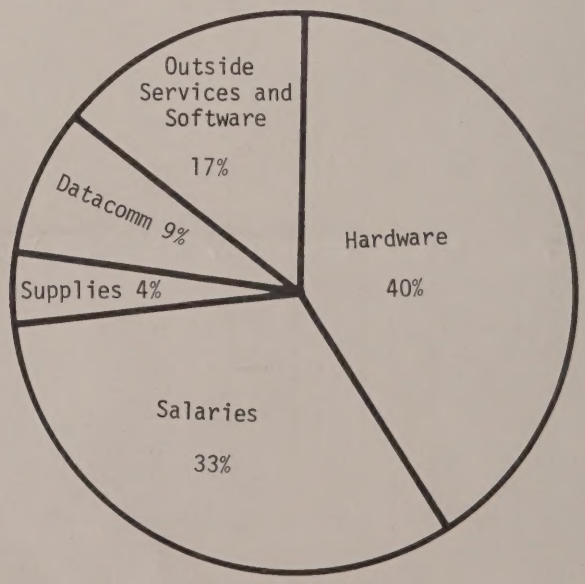
EDP SPENDING: DISTRIBUTION AND GROWTH

PERCENTAGE GROWTH

INCREASES IN SPENDING	All Hardware	All Outside	Salaries	TOTAL
1974	12	19	14	17
1975	15	17	10	15
1976	17	17	12	15
1977	19	19	9	16

Spending for 1976-77 shows less of an inflationary trend than 1975-76.

DISTRIBUTION



$35.7 Billion -- 1977

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- Spending for data communications equipment will surpass $1 billion, that for line costs will approach the $2 billion level.

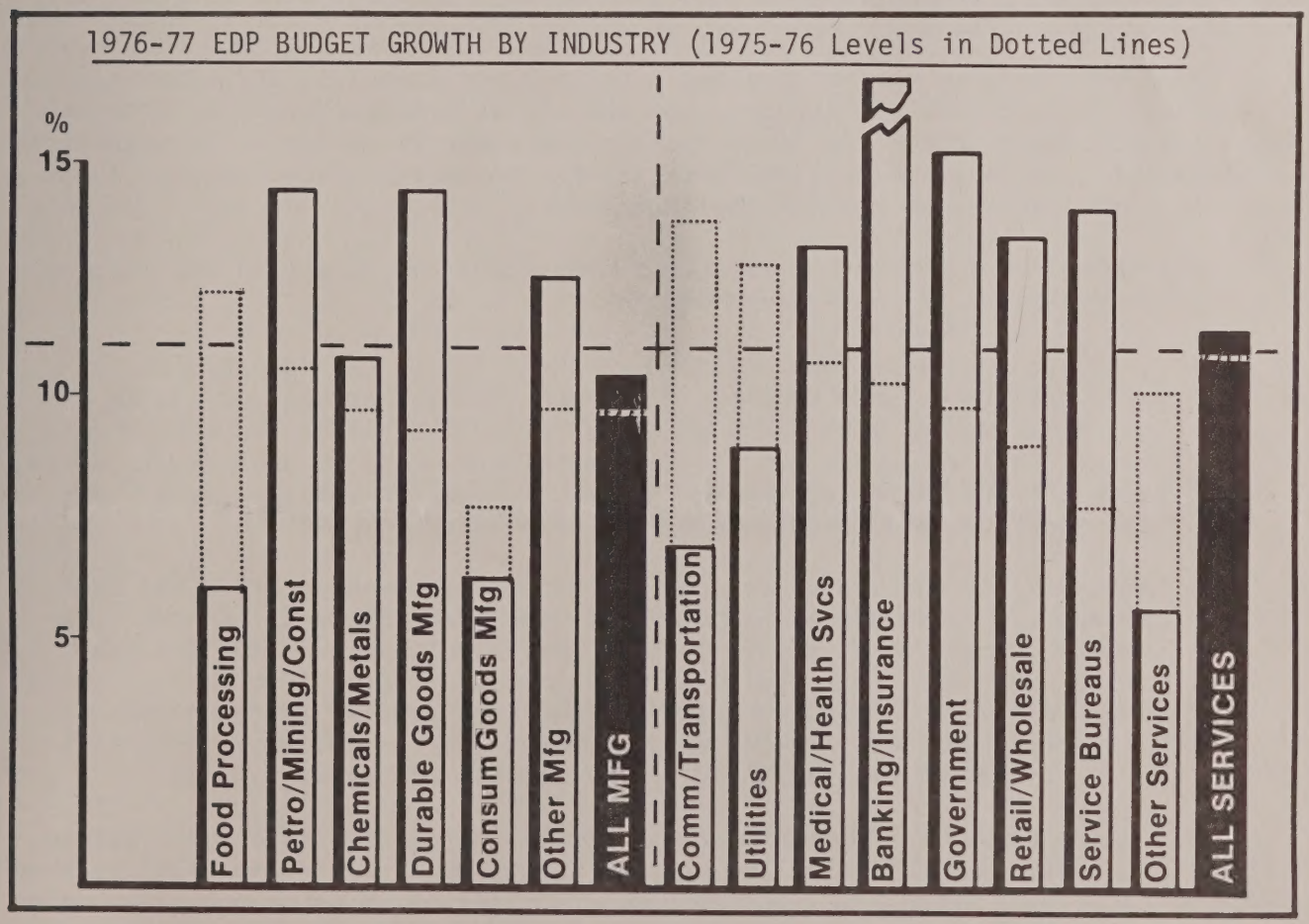
- Sales and service of minicomputers will top $2 billion.

- In 1977, remote computing services will outpace batch services for the first time, at $2.2 billion and $2.0 billion respectively. The sale of software packages will almost equal the three-quarters of a billion dollars that will be spent for custom work this year.

- With an estimated spending growth of only 5%, the inflationary spiral of computer room supplies seems to have dampened. Users this year will spend only $60 million more than last year's $1.2 billion.

Within the IDC sample, users expressed some interest in non-Bell data communications services -- primarily in point-to-point private line and packet-switching -- but the tumble of Datran last year seems to have inhibited any wide spread migration. IDC also found a slow but steady changeover to IBM's SNA, but only a hestitant acceptance of its IBM 3850 Mass Storage concepts. In addition, as the installed base of minicomputers increase, services and maintenance becomes a bigger part of vendor revenues . . . so much so that by 1980 they will account for over $1 billion of the minimakers' $5 billion worldwide revenues.

IDC also examined user spending plans by industry and found some interesting changes from last year to this -- connoting a rebound in some of the areas of the economy that had been depressed. Durable goods manufacturing, wholesale/retail



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USER SPENDING BY MAJOR CATEGORIES ($ MILLIONS)

	1974	% Δ	1975	% Δ	1976	% Δ	1977
EDP Systems	7,171	13	8,100	11	9,000	12	10,060
Other Hdwe	1,686	25	2,115	37	2,915	41	4,115
Datacomm	1,568	29	2,020	27	2,575	24	3,205
Software (Outside)	855	19	1,020	20	1,225	20	1,475
Services (All)	3,035	16	3,530	16	4,080	19	4,845
Supplies	991	14	1,130	6	1,200	5	1,260
Total Non-Salary	15,306	17	17,915	17	20,995	19	24,960

(% Δ indicates percent change; "Other Hdwe" includes minis, data entry gear, and information appliances; "Services" includes non-computer users.)

distribution, banking, petrochemicals, mining, and construction showed substantial gains. The biggest downward trends were registered by the food processing industry, the communications and transportation industry, the utilities, and the non-computer industry services.

Users as smart shoppers

Besides toting up the dollars and cents of user spending, IDC also tries to get a feel for motives. Environment, of course, is a major factor as more and more installations go on-line -- even at medium-scale sites now -- and the centralization cycle begins wheeling over into the decentralization cycle. These are the normal forces at work on user budgets.

But IDC also picked up two countervailing trends in user spending that seem particularly pronounced in 1976 and 1977:

+ Users are ever more sophisticated in their EDP usage and spending . . . which translates into revenues for companies like Amdahl, growth in industry subsectors like packaged software, and acquisitions through purchase. In a way users are prodding mainframers toward unbundling, minimakers toward increased support and service, batch services toward on-line services, and new subindustries into being.

+ IBM's 370/138 and 148 introduced new price/performance curves for IBM systems . . . and users were quick to recognize the fact. If their increasing sophistication were leading them away from hardline IBM doctrine, the Giant's new "bang for the buck" is leading them back. Although users are no longer quite so leary of shedding the IBM cloak of Reliability-Availability-Service, with the 138 and 148 they don't have to . . . and IBM has initiated a new industry standard.

For users these trends mean more quantitative decisions is areas traditionally fraught with subjectivity; for suppliers they mean more responsibility than ever to gauge user needs . . . and perhaps a shrinking IBM price umbrella.

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U.S. - COMPUTER SYSTEMS HARDWARE ($ MILLIONS)

	1974	% Δ	1975	% Δ	1976	% Δ	1977
System Rentals	3,905	11	4,335	5	4,570	9	5,000
Ind. Periph. Mnfr. Rentals	275	29	355	24	440	20	530
Third-Party Lease Spending	870	7	935	10	1,030	8	1,110
Purchases: Gp A Gen. Purp. Sys.	1,643	16	1,900	20	2,280	15	2,620
Maintenance: Gp A	478	20	575	18	680	18	800
Total EDP Systems	7,171	13	8,100	11	9,000	12	10,060

IBM as a smart supplier

User spending patterns do not spin themselves out of -- or into -- thin air. They reverberate through the industry . . . and affect supplier strategy. IBM is the best case in point. Its major announcements for 1976 -- which will have a bearing on 1977 spending -- came in the area of mainframes and minis and encompassed new pricing strategies, software costing, and purchase-to-lease ratios. While the company's revenues climbed 13% in 1976, its earnings went up 20.5%. Revenue from outright sales went up 31%, rentals and services rose only 4.5%.

But if IBM is going to stem the tide of EDP spending that is going to competitors in distributed processing, plug-compatible computers, small systems solutions, etc., 1977 will probably see more reactions from the company . . . which, according to IDC estimates, could run the gamut from:

- New mainframes at or better than the 138/148 price/performance level, probably at the 168 and 158 end to combat Amdahl and Itel and to offer its large-scale sites relief from burgeoning workloads,
- Cuts in memory pricing (to IBM 5100 or lower per-bit prices) and further unbundling of system software in "selectable units,"
- Utilization of the Series/1 in other products (communications processors? DDP systems?), a continued push toward SNA, and an intelligent IBM 3270 controller,
- A new GSD line that will expand the System/3 upward, deeding some of DPD's traditional low-end territory to the Atlanta division, to
- Insertion of 3850 Mass Storage System technology into smaller and less costly products, a higher-capacity 3350 disk drive, an IBM-made tape cartridge drive, and perhaps establishment of OEM relationships.

And whether IBM's actions are causes or effects of computer spending patterns, 1977 trends should remain strong in following years . . . with basic computer room hardware holding its own against the smaller, faster-growing segments.

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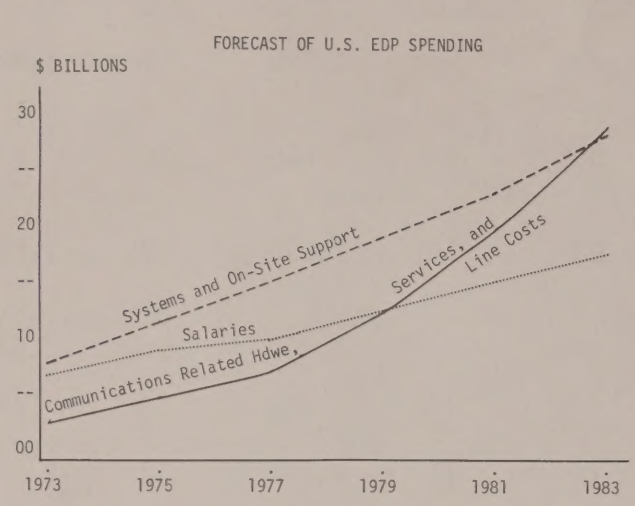
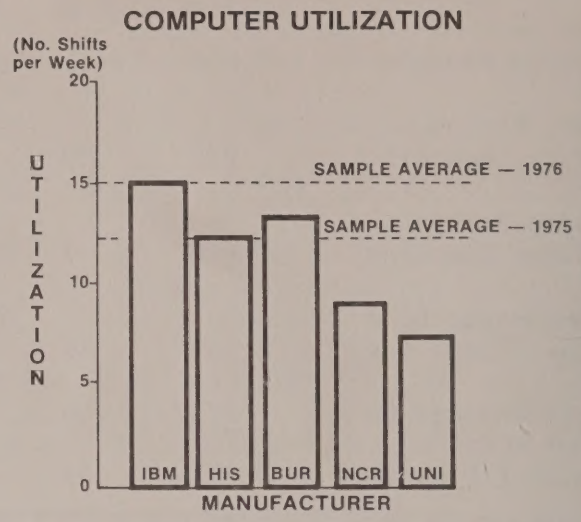
U.S. EDP SPENDING FORECAST AND COMPUTER UTILIZATION





Competitive prognosis

Barring another recession or runaway inflation, 1977's double-digit "real dollar" spending for EDP goods and services should last through the end of the decade. New applications are buoying demand -- on an equipment base that is already near capacity -- and even the major new products announced in 1976 by the computer manufacturers may not be enough to slake that demand.

IDC predicts, for instance, that the net addition to the U.S. installed base of general-purpose computer systems will average 60% of shipments . . . slowly rising until 1980. That's up from a low of 40% in 1972 -- just before IBM 370 shipments began in bulk -- and will approximate that of the international net-to-shipment ratio that is currently making overseas markets so attractive to U.S. manufacturers of EDP equipment.

For EDP suppliers in 1977, IDC sees the following growth prospects:

- Excellent (15% to 50% growth): IBM, minicomputer manufacturers, COM and other paperless alternatives, data base software suppliers, EDP service companies, independent teleprocessing hardware makers, and OEM markets overall.

- Good (10% to 15% growth): Non-IBM mainframers, independent PCMs (tape), third-party maintenance, and third-party leasing firms.

- Adequate (up to 10% growth): Independent PCMs (disk), key-to-disk suppliers, independent communications networks, business forms, and supplies companies.

Overall, U.S. EDP spending over the next six years should total over $300 billion, reaching an annual expenditure in 1983 of $75 million or more. The fastest movers will be communications-related hardware, services and line costs; salaries will slowly decrease as a percentage of total spending. No matter how you slice it, that's an attractive pie for industry suppliers.

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WANG LABS ANNOUNCES A NEW DESK-TOP COMPUTER AND "MINIDISKETTE" SMALL BUSINESS SYSTEMS, SOFTWARE, AND PERIPHERALS ALSO ADDED TO ITS LINE

March came in like a lion for prospective buyers of small business systems and desk-top computers, as Wang Labs mounted its spring offensive by introducing some twenty new hardware and software products. According to the company, now a $100 million a year supplier of small business systems and word processors, the product line additions will double the performance of its small business line.

The most unique of the new products is the PCS II, which Wang calls a "deskette" computer, and which makes use of a Shugart-manufactured "minidiskette" storage device. About one-fourth the size of a regular "floppy" disk, the 89,600KB minidiskette provides faster memory access than either tape cartridges or cassettes, the traditional auxiliary storage media for desk-top computers such as the IBM 5100. According to Wang, which helped Shugart develop the minidiskette, the new PCS II provides four distinct advantages: 1) True desktop computing, 2) Random-access memory, 3) Fully supported software, and 4) Compatibility with the est of the Wang product line.

The PCS II, which can be purchased fully equipped for just over $9,000, is a follow-on product to Wang's cassette-based PCS I ($5,400). It comes with a large 1,024-character CRT screen, a typewriter-like keyboard with numeric pad and special function keys, a high-speed CPU with 8KB (expandable to 32KB) of main memory, and 42.5KB of reserved memory for the operating system and BASIC language interpreter, and either one or two minidiskettes.

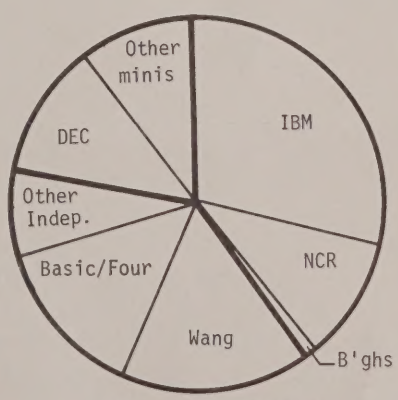
Announced along with the PCS II were:

- The WCS/25 and WCS/40 small business computers, aimed especially at the forms-processing end of the market. The WCS/25 includes a Wang 2200 CPU, diskettes, printer, front-end controller, and either three of four interactive terminals. Its price ranges from $26,750 to $40,000. The WCS/40, now the high end of the company's WCS line, provides both multiprogramming and multiprocessing. The disk-based WCS/40 can support up to eight interactive terminals, data communications, and a slew of miniperipherals. Its price ranges from $49,000-$80,000.

- "Deskette"-based software packages and a new forms building and data entry language for the PCS-II. The applications packages provide support for such end-user activities as patient billing, accounting client write-ups, letter-writing and editing for insurance agents, and so on.

- Other peripherals in addition to the minidiskette. These include a new interactive terminal, four new printers, a new multiplexor, and two new communications controllers.

SMALL BUSINESS COMPUTER MKT
U.S. Mfr's Worldwide Base



1976 -- $1.2 Billion

All in all, it looks like new strata of end users will soon be availing themselves of the power of the computer . . . on their desks, no less, for under $10,000 . . . the cost of an IBM 1440 a decade ago.

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• A BUBBLE TO LESSEN YOUR TOIL AND TROUBLE FROM TI is a 92K-bit single chip magnetic bubble memory, the TBM0103. The commercial device's major loop/minor loop architecture makes it ideal for portable storage. First bit access time is 4 msec; cycle time for a 144-bit page is 12.8 msec. TBM0103 prototypes will be available in late 1977 at a cost of about $200. In addition, TI has introduced a 65K-bit CCD memory, a 16K-bit u.v. EPROM, a high-performance MOS RAM, and four fully static MOS RAMs.

A new thought for DDP/DC networks is TI's 770 intelligent terminal. This desktop unit features dependable, easy-to-use hardware and software, and the latest in semiconductor technology. Data entry and processing are simplified by TPL-700, a business-oriented terminal programming language. RAM expansion (to 24K bytes), 30 cps nonimpact printer, video display graphics, and communications interfaces are some of the available options.

• TELENET GETS THE MESSAGE ACROSS through a recent agreement with RCA Globcom that will provide packet-switched data communications between the U.S. and overseas points. Multinational corporations, public data banks, and computing service bureaus are expected to be the primary users. Telenet also connected with Teleinformatic de Mexico, S.A. (TIMSA) to inaugurate computer communications between the U.S. and Mexico. The system will save up to 50% in data communications costs. In addition, Telenet is expanding its North American packet-switching service to include 85 cities, and will offer Hotline Data Service beginning in June. Users will pay a flat monthly rate (independent of distance) for the service.

• ALL THAT'S FIT TO PRINT AND MORE can be handled by Honeywell's powered-down Page Printing System (PPS), which incorporates nonimpact electrographics with Level 6 microcomputer technology, and offers a new price/performance level. The basic system prints 8,000 lpm, but can be upgraded to 18K lpm on-site. The $3,541 monthly lease price should make this PPS appealing to a wide variety of users.

• INTEL BUTTS INTO MARKET WITH FIRST INTERCHANGEABLE 4K & 16K RAMs that are electronically and logically compatible, and easily combined with existing memories.

• DEC'S MINICOMPUTER FAMILY ADOPTS NEW MIDRANGE MEMBER, THE PDP 11/60 with integral cache memory and two-stage floating decimal point processor. It combines many of the PDP 11/70's features into a compact, fully integrated system that has 256K bytes of main memory, an error correction code (ECC), and self-maintenance and diagnostic test capabilities.

DEC also introduced the LS120 DECwriter III, a low-cost, interactive printer that operates at 1200 baud, and incorporates existing subassemblies with a microprocessor-based control board. The LS120 can be used in computer, data, and message networks.

• NCR HAS DEVELOPED A CONNECTION FOR DATA COLLECTION that will link its Model 250 electronic cash registers to a mainframe computer through a Century/Criterion Communication Utility (CCU). The register's transactions are recorded on cassette, and are automatically retrieved (via telephone lines) after store hours. The CCU software package replaces minicomputer polling, and has a $125 monthly license fee.

• DATAPOINT SYSTEM TO DIRECT A PIZZA THE ACTION for Pizza Hut Inc., which has ordered 7 Datapoint intelligent terminals as part of a "classical" DDP network field test. Area offices will collect and process POS terminal data from the firm's restaurants, then transmit summaries to a CPU in Wichita corporate headquarters.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" MARCH 29, 1977 • VOL.12,NO.18 P.J.McGOVERN,PUBLISHER

Inside -- Midterm report on EFT

IBM ANNOUNCES HIGH-END CPU, CUTS PRICES; AMDAHL COUNTERS IN KIND

There was the typical Friday afternoon stir last week after IBM slashed Mosfet memory prices and cut the purchase price of its large CPUs to "bring their price/performance more in line with the 3033," a new top-of-the-line processor. Quickly, an Amdahl spokesman told EDP/IR the company "wasn't surprised . . . and was reacting." He hinted at a major announcement; it came this week.

So, in a matter of days, the IBM world's cost of memory -- telegraphed in GSD's Series/1 announcement last year -- drops to the $110,000/Mbyte level. And the price/performance of large CPUs goes up again. As a result, mainframers and others have a new memory price umbrella, add-on memory firms especially must rethink their offerings, third-party lessors and used computer dealers face lower residual values. A marketplace crunch is on.

Specifically, IBM cut 30% off the purchase price of 370/158 and 168 CPUs, dropped the rent, lease, and purchase price of additional Mosfet memory, and introduced the 3033 Processor -- with 1.6 to 1.8 times the computing power of the 168-3 at less than the old price! For its part, Amdahl has adjusted prices downward to the same memory slopes, announced a "cost-reduced" 470V-6 to be called the V-5 (with 2/3 the power at 3/4 the price) and a new V-7 with more than 1.5 times the performance of the V-6. The 3033 is due early in 1978, the V-7 that August. In addition to hardware, some strategy is unfolding:

- The 3033 designation of the new IBM processor fits into the scheme used previously for support processors (3052 and 3062 for Attached Processors, 3838 for the Array Processor) and suggests the trend for CPUs to be considered only a component in a computer system. Also, the official designations of U4, U6, and U8 for the three sizes of the 3033 suggest multiprocessor versions.

- MVS/System Extensions -- a $1,250/month program product that increases throughput 14% by cutting overhead -- runs directly on the 3033 but requires a 370 Extended feature ($17,000 on 158 processors, $65,000 for 168s) to operate on older CPUs. Thus, IBM has introduced its first software/microcode/hardware package that will cause Amdahl to think.

- The memory price cuts have been called everything from "quite aggres-

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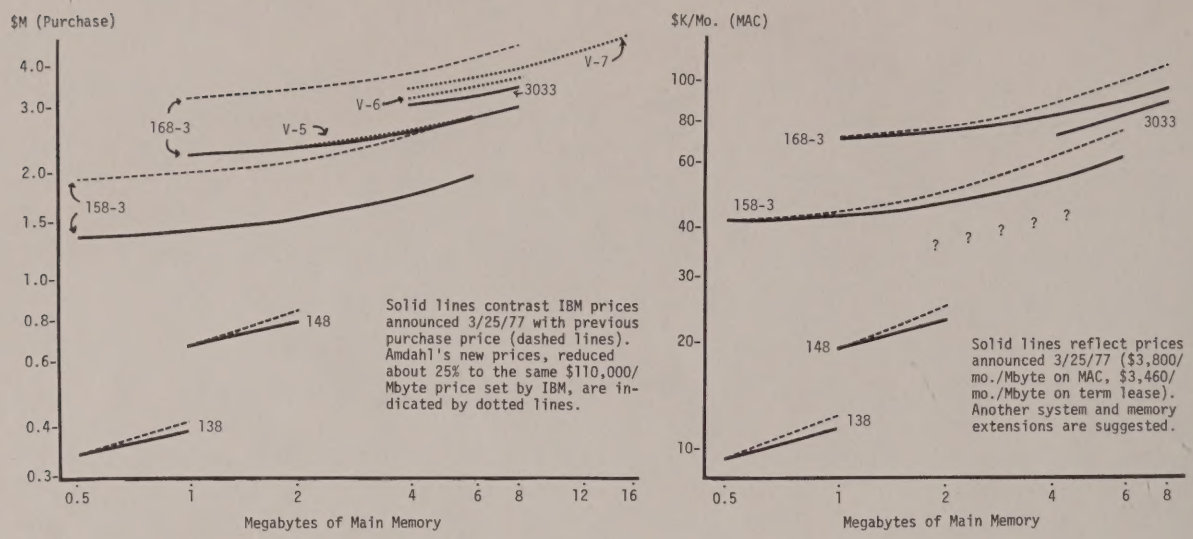
NEW PRICE/SIZE RELATIONSHIPS OF LARGE IBM PROCESSORS



TWO PERSPECTIVES ON THE LARGE COMPUTER MARKETPLACE come from a look at the IBM announcements on a monthly basis (right) and by purchase price, with Amdahl announcements included (V-5 prices are virtually identical with new 168-3 prices). On a relative power scale with the 168=100, EDP/IR estimates the 158-3=52, the 168-3=109, the 3033=185; also, the V-5=120, the V-6/II=184, the V-7=294

sive" to "leaving money on the table." They seem to indicate increased competition and/or fewer antitrust worries. They also raise questions about the life expectancy of the 158 and 168. Is the move a mid-life kicker or the announcement of a "fire sale"?

The immediate implication is clear: IBM has Amdahl in check. With the new 168-3 prices the same as the new V-5, and the 3033 priced below the V-6/II (Amdahl's improved version) and offering similar power, users are beginning to ask questions. Already, one large bank has cancelled an Amdahl letter of intent and opted for the 3033. Hardware being equal, it decided to stay with its software supplier.

\+ + + +

AS THE NATIONAL EFT COMMISSION ISSUES ITS INTERIM REPORT . . . UNCERTAINTY DAMPENS, BUT DOESN'T THWART, EFT TERMINAL MARKET GROWTH

It's been a year since the presidentially-appointed National Commission on EFT held its first meeting and the tone of its first report -- "EFT and the Public Interest," issued last month -- was as cautious as a banker in a pool game. For EFT proponents the Commission's lack of dramatic pronouncements may have been disheartening . . . a lot of explosive growth rates are waiting for EFTS to take off.

But if the Commission's pace and stance are maddeningly cautious, its approach is methodical, its mandate broad . . . this seemingly dull, plodding organism could well become the cutting edge of future public policy.

For EFTS, if it is to flourish and bring the benefits of technology to the banking public, will affect the whole structure of the U.S. banking industry, not to mention our consumer society itself. The Commission's primary concern -- the interface of EFT and the American consumer -- is a big and ticklish one indeed.

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For the consumers . . .

In the Commission's opinion, EFT ultimately benefits consumers, and attempts to restrict it -- or the competition it implies -- are misguided. With that in mind, the Commission enumerated two goals for future public policy:

+ "Ensuring that EFT realizes its potential to heighten competition among depository institutions and expand payment alternatives.

+ "Removing the uncertainty surrounding EFT transactions by providing the basic framework for assignment of rights, responsibilities, costs, and privileges among the parties to the transaction."

"Therefore," goes the report, "the Commission recommends that fair choice among available payment instruments be preserved, and that fair or discriminatory pricing practices . . . be prohibited. Acceptance of a particular service or participation in a particular depository institution should not be mandated as a condition of purchase, employment, or receipt of benefit."

To further dispell consumer "uncertainty," the Commission favored treating EFT transactions like existing check transactions. Banks, for example, would "be liable for erroneous, unauthorized, or fradulent use of the EFT account." They'd also have to provide records that perform the same function as cancelled checks, provide notification of pre-authorized credits, and provide regular descriptive statements of account activity acceptable in the courts, IRS chambers, etc.

But EFT customers would also have responsibilities. These include security of personal identification codes, prompt reporting of card loss, and reconciliation of account records. Still, the major burden for security would fall to the institution . . . and its EFT technology.

For the vendors . . .

The EFT market will remain ill-defined until a consensus is reached -- or mandated -- on just what the various offering institutions can and can't do. For suppliers to those institutions, the Commission's findings were not particularly helpful. The Commission did, however, make four points regarding EFT technology:

- EFT equipment vendors rarely sample consumer attitudes directly, relying instead on studies performed by the offering financial institutions and independent sources.

- Worries about product reliability aren't the Commission's domain . . . "The users and the market place will weed out unreliable products based on performance, cost, and other competitive factors."

- While privacy is an important concern, it has no identifiable technological component and is better dealt with as a consumer issue.

- In the areas of competition, standards, and security, there is widespread concern but little agreement. Because of the extent of the controversy, the Commission requires further study.

Once again, computer industry suppliers find their markets subject to forces outside their control. And as markets bend to sociological winds, *(To page 6)*

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EFT AND THE BANKING STRUCTURE

Clearly, EFT is less dependent on technology than on the nature of the banking industry . . . and a byzantine nature that is, too.

First, there are all kinds of financial institutions out there. These include commercial banks, which can be chartered under either Federal or state laws and regulation . . . savings and loan institutions, also either Federally- or state-chartered . . . and mutual savings banks and credit unions. State-chartered institutions come under state regulators; Federally-chartered institution come under several Federal overseers (Comptroller of the Currency, Federal Home Loan Bank Board, etc).

The trouble begins when Federal rules differ from state rules -- which is more often than not -- and in most cases the Federally-chartered institutions would have the competitive edge if it weren't for something known as the "McFadden Act." This act says that a Federally-chartered commercial bank (the law doesn't discuss thrifts) is not permitted to operate under rules that are more expansive than the rules under which its neighboring state-chartered banks must operate. The Act was written with a particular eye toward the difference in state-by-state bank branching laws.

And there's the rub. The more conservative bankers argue that EFT equipment in non-bank locations constitutes a branch since the machinery performs all the transactions which the McFadden Act says describes a branch. Others, who are interested in developing EFT systems beyond the traditional scope of intrastate branching, say that EFT devices should be considered merely a new way to communicate with a bank -- along the lines of a mailbox and the Post Office. So far the Federal courts -- including a few appellate courts -- have favored the conservative view of EFT machines as branches. The Supreme Court has so far refused to hear the EFT cases sent to it from the lower courts.

Branching isn't the only problem. For one thing, the balance between commercial banks and thrifts has been changing over the years . . . for another, technology is making the limitations of state boundaries more and more archaic. The problems, therefore, are nationwide -- and require a nationwide solution. But so far the Congress' reaction has been a flurry of moratorium proposals, a wait-and-see deferral to the work of the National Commission on EFT, and the introduction of a "Remote Electronic Facilities Act," which would release EFT equipment from the branching definitions of the McFadden Act.

Activity at the state level has been more impressive. Over half the states -- 27 of them -- have passed some sort of law regarding EFT. Five of those have a unit banking tradition, six permit limited branching, and sixteen allow statewode branching. Only four states define EFT equipment as branches, eight are silent on the matter, and fifteen state that EFT devices are not branches. Geographical usage of unmanned remote facilities is allowed in some, restricted in others. A few even allow out-of-state equipment. Twenty-three have addressed the sharing of faciliteis issue, sixteen have made it mandatory.

In other words, EFT enlightenment seems to be stemming mostly from the states . . . but with the national scope full EFT usage would engender, any meaningful mandate for development must come at the national policy level.

Enter the Commission.

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EFT AND MONETARY POLICY

Electronic "money" will do more than replace the paper stuff . . . it will also alter the concept of money itself and affect policies that have built up around the old definitions:

"The visible consequences of EFT that may have significant implications for monetary policy," says the Commission, "are (1) a substantial reduction in both the cost and the time required to complete payment transfers; (2) an increase in the frequency of salary and wage payments; (3) increased direct or indirect use of interest-bearing thrift accounts at bank and nonbank depository institutions for transaction purposes; (4) reduction in float of all types -- mail, Federal Reserve, and commercial bank; and (5) increased competition among and between banks and nonbank depository institutions."

Fully-implemented EFT, according to the Commission, would complicate monetary policy in four distinct ways by affecting:

- The choice between money aggregates ("M1," "M2," etc.) and interest rates as targets in setting national monetary policy.
- The definition of "money" used for monetary management purposes.
- The level and variability of the public's demand for money balances.
- The structures and powers of institutions in private financial systems through which monetary policy operates.

For example, EFT will likely erode the usefulness of monetary aggregates such as "M1" -- demand deposits and currency -- as benchmarks of the nation's money supply . . . which, in turn, will affect the way the Federal Reserve determines interest rate policy. Arthur Burns himself, Chairman of the Federal Reserve Board, has pointed out that "M1" is now growing at a slower rate than the other money aggregates and that "the financial innovations now in train will continue to reduce materially the proportion of transactions balances that are held in the form of currency and demand deposits."

(While the Commission felt that EFT may decrease the significance of the monetary aggregates, it also felt that it will not materially affect the ability of the Fed to influence economic activity through interst rates.)

From the banking system's point of view, the Commission stated that "certain proposed legislative and regulatory changes in the powers of depository institutions may have a significant influence on the extent to which EFT will affect monetary policy." New rules could allow, for instance:

+ payment of interest on all transaction balances
+ assessing reserve requirements against all transactions balances, regardless of the type of institution holding them
+ payment of interest on reserve balances

In a matter a little closer to home to most of us, the Commission addressed the question of the "float" lost through the use of EFT. "Float is not a legal right, but rather a characteristic of the present payment system. There are alternatives such as checks and value dating . . . ."

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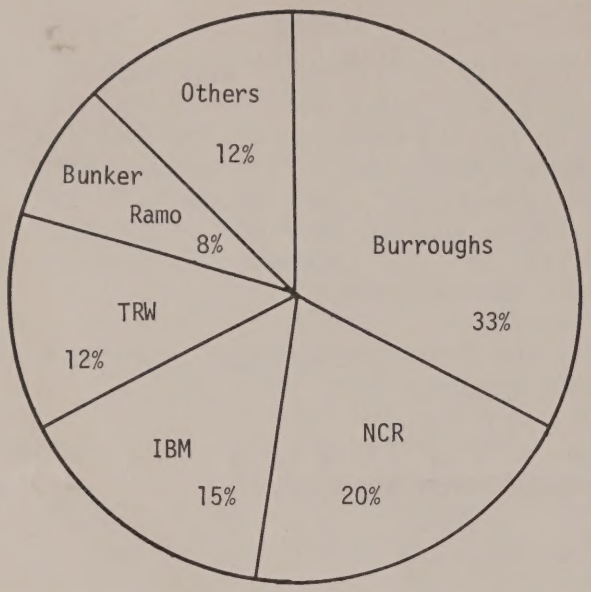
THE BANKING TERMINAL MARKET

Market Share



Statistics

Units Inst. 12/76 (U.S.) --	90,000
5-year Growth Rate	25%
Cumulative Shipments	$1.5 Billion

Device Breakdown

Autotellers	6,000
Passbook Terminals	50,000
Commercial Terminals	34,000

Note: Docutel accounts for 60% of installed base of autotellers

so do the fortunes of individual companies and subindustries. Credit card terminals are a case in point. While the installed base for credit authorization terminals -- the first and most easily justified step toward EFT -- has outstripped forecasts, the base for EFT transaction terminals has yet to meet its potential. The Autoteller market is another example . . . uncertainty over sharing provisions has given a young, bright market a decidedly conservative growth rate.

For the bankers . . .

If the Commission has done anything to dispell the "uncertainty" that currently plagues the EFT marketplace, it's in its stance on terminals. Rather than consider them branch banks, says the body, look instead at what services are provided with them . . . and determine which are to be regulated and how. The Commission saw two basic types of EFT services:

- Information services -- including, but not limited to, credit authorization, check verification, check guarantee, and file lookups.
- Funds transfer services -- including deposit, debit, debit with overdraft, and credit functions.

Information services, says the Commission, should remain available as they are today . . . but funds transfer services need change. Banks, for instance, should be able to offer debit services anywhere in the country through terminal-based EFT systems, says the Commission . . . while deposit-taking should be initially restricted then expanded step-by-step first to an intrastate level, then to a regional ("natural market") level. The Commission recommends a Congressionally-set timetable for the expansion.

But the rules that govern terminal deployment, says the Commission, needn't be any more restrictive than the rules that govern the services being offered

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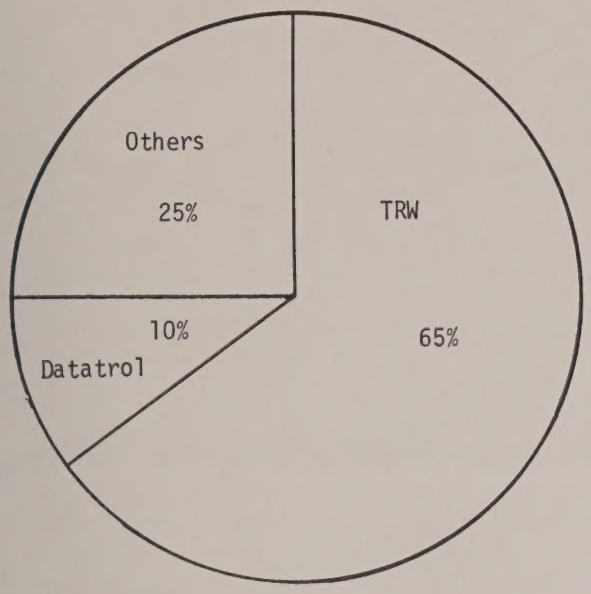
THE CREDIT CARD TERMINAL MARKET

Market Share



Statistics

Units Inst. 12/76 (U.S.) --	100,000
5-year Growth Rate	35%
Cumulative Shipments	$350 Million

Device Breakdown

Credit Authorization Terminals	90,000
EFT Transaction Terminals	10,000

with them . . . and nondepository institutions (retail stores, for example) in the EFT system need not be regulated.

As for sharing of EFT systems and/or equipment, the Commission expects it will occurr "naturally" and frowns on mandatory sharing. If sharing has to be mandated, the Commission would support "pro-competitive sharing," where parties may share by mutual agreement and disputed are settled on a case-by-case basis depending on the effect of the sharing on competition. Antitrust laws, however, would still apply to the sharing of ATM and POS systems, regardless of state law.

. . . and for posterity

So far the Commission has looked at six areas germane to EFT: (1) EFT and the consumer, (2) The branch/terminal issue, (3) Sharing of EFT systems, (4) Government operation of EFT, (5) EFT and monetary policy, and (6) EFT technology.

And while the report mainly calls for more study, skirts the really controversial areas, and is unecific in its recommendations to Congress and the President . . . still, it's the beginning of a good background document for the lawmakers who must eventually address the issue. (As more and more computer industry types are coming to realize, educating legislators can be a full-time job.)

Before its final report is issued next October, the Commission will focus, finally, on some of the technological and marketing issues affecting EFT vendors. Specifically, the Commission will look at common carrier versus nonregulated vendor competition, standards, and security. The panel will also sort through a compendium of other issues still under study . . . such as EFT in other countries, Automatic Clearing House (ACH) rules and operations, the credit markets, and the cost/benefits of EFT.

And after that, the EFT brouhaha begins in earnest.

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• NCR TO COMPUTER USERS: "GET READY" . . . for the Dayton mainframer will be announcing a slew of new computers this year. In an announcement of upcoming announcements -- which seems to be becoming a computerdom PR fad -- NCR revealed that eight new computer systems are on the block for introduction this year. They will include virtual storage models of the Criterion family, new interactive and multiprogramming systems, and "dual mode" models which permit a user to move from one type of operating mode to another without a changing applications software. Four of the new models will be released next month, four will be released later in the year. The new systems should do much to flesh out NCR's not-exactly-fat product line; in addition, the company will probably announce a network architecture. NCR's computer-related revenues topped $1 billion last year, says the firm.

• IBM HAS ADDED CAPABILITY TO ITS MAJOR DDP PRODUCT, THE 3791, including more data entry formats, local programmability, addition of a supervisory IBM 3760 terminal, faster printing, and faster communications. Programming support and host attachment for the 3760/3790 data entry system has also been extended to allow connection to an IBM 370/115. The company also announced a new "remittance processing system," the IBM 3762/3790. In a single operation the new system can reconcile, inscribe, and endorse bills and checks, then produce batches of checks and payment records coded and ready for bank deposit. IBM sees a dual-station 3762 as capable of processing 1,400 bills an hour. The 3762 utilizes optical scanning but can handle other data entry functions as well. A representative system consisting of four dual-station 3762 terminals and a 3791 controller would cost $8,288 under ETP, $9,639 under MAC rental, and $338,000 to purchase.

• THE JOCKEYING FOR POSITION IN THE DDP DERBY IS GETTING INTENSE: Sperry Univac has admitted making overtures to Varian Data Systems . . . Nixdorf has made a serious bid to acquire Entrex. Both deals would enhance the big companies' abilities in the emerging market for small, communications-laden processors ripe for DDP applications. The smaller companies would benefit from the financial clout their new owners could bring. As one Entrex spokesman said, it's "a little along the lines of Fujitsu and Amdahl." In any case, few specifics about either possible acquisition have been released; neither is in its final stages yet.

• QANTEL HAS PUT WINCHESTER TECHNOLOGY IN MINIHARNESS with its new Model 1400 processor, announced along with other products this week. The 1400 systems, which uses a 25 Megabyte fixed-head, sealed disk drive new from Memorex, comes with an intelligent 16KB disk controller, 2 CRTs, 16KB of memory, a 300 lpm printer and 1600 bpi tape drive in addition to the disk storage. The basic system can be expanded to support 96KB of memory, higher-speed printers, and up to 64 CRTs. Its selling price is $64,900.

Along with the new processor, Qantel has developed a "Program Generator" and "Report Generator" to aid its distributors in installing systems for first time users. The first software package is used by the distributor in setting up the customer's first applications, the second is used by the customer himself to generate reports programmer-free. Qantel currently has 800 systems in the field and expects to add about 400 more this year.

• WHEN JUDGE EDELSTEIN EXPRESSED SOME IRRITATION at a Law Journal forecast that the IBM trial would last two more decades, he noted that IBM Counsel Nicholas Katzenbach is on the pub's Board. IBM attorney, Thomas Barr, denied any knowledge of the forecast and quipped that his first reaction was to go back and hide the article before everyone at his law firm bolted out the doors. Food for thought!

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Review and Forecast

EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" APRIL 22, 1977 • VOL.12,NO.19&20 P.J.McGOVERN, PUB.

Springboard year

COMPUTER SHIPMENTS HIT $13 BILLION; NEW PRICE/PERFORMANCE CURVES FASHIONED

Starting off almost glassy calm -- yet with user spending plans and vendor product enhancements portending later excitement -- 1976 turned out to be a year of fundamentals, of building. And judging from the IBM-laden events of the last several months, it was the springboard for what looks to be a raucous 1977.

Perhaps the single biggest development in 1976 was IBM's introduction of two new 370s . . . and new price/performance curves to go with them. But in a year which saw computer shipments nudge $13 billion, services revenues reach $5 billion, and spending on data communications top $2.5 billion, noteworthy events were thick and varied:

- New mainframer product lines appeared, older ones got revamped and repriced. General-purpose computer shipments hit $10.5 billion worldwide.
- In data communications, the mainframers announced or enhanced their network architectures . . . while AT&T sparked controversy with its "Bell Bill" and tariffing of the Dataspeed 40/4.
- IBM settled with Telex and won against CalComp in antitrust suits. Meanwhile, the IBM-U.S. trial set new standards for slowness.
- Subindustries prospered. Minimaker revenues jumped 36%, U.S. general-purpose terminals and data entry devices hit $8 billion installed.
- Plug-compatible CPUs arrived; IBM's reactions began rippling through the add-on memory, third-party leasing, used computer, and other businesses.

The basic trends remain . . . data base management, on-line applications, distributed processing, increasing user sophistication, etc. But EDP/IR detects another trend in more recent events . . . increased aggressiveness and competitive pressure from IBM. Whether as a result of its courtroom successes or simply the economics of semiconductor production, the Giant's latest price cuts and performance increases will have a wide-ranging impact on the whole industry.

Upshot: The mainstream computer business looks ready to roll off its three-year shipment plateau . . . possibly sparking the separate pricing of software.

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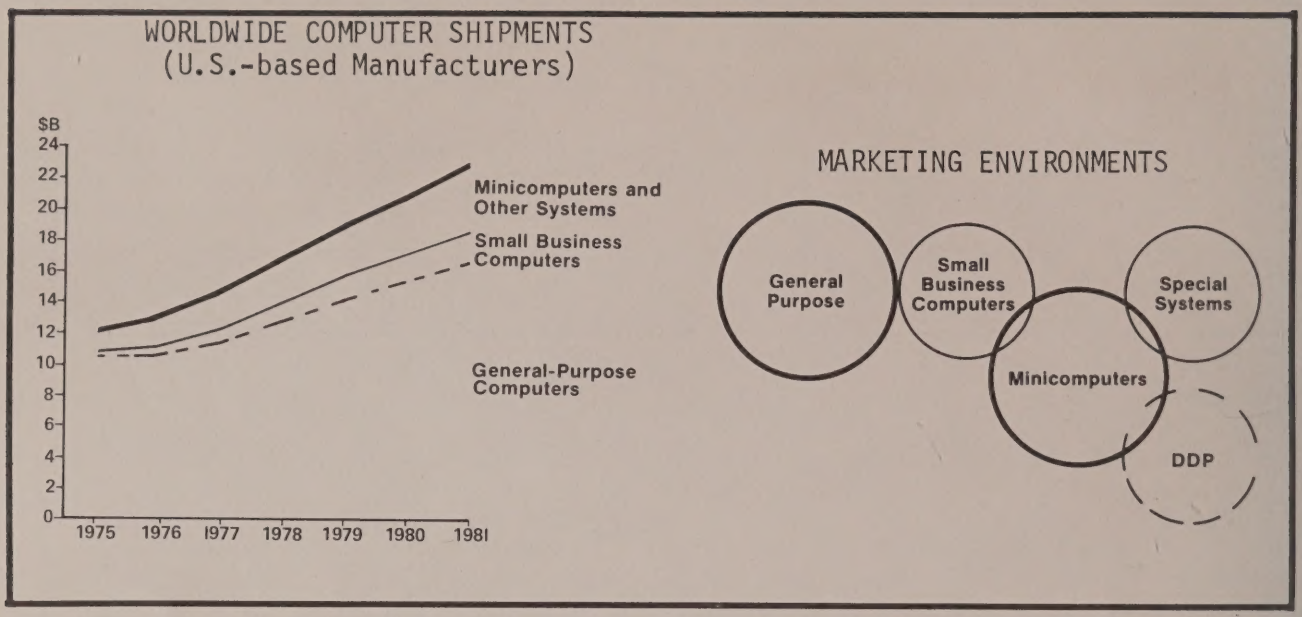

A new look at the computer market

EDP/IR and publisher IDC have traditionally split the installed base of computers into two camps . . . general-purpose (Group A) and dedicated application (Group B) computers, the latter consisting primarily of minicomputers. But definitions in an ever-changing industry tend to get hidebound, so this year the base has been broken into more meaningful divisions. Details -- including model-by-model censuses -- are presented in this issue. But basically, IDC distinguishes:

- General-purpose computers are the "bread-and-butter" commercial systems from IBM and the other majors. This category consists of the old general-purpose Group A computers, Size Classes 2 through 7.

- Small business computers cater to the first-time commercial user and include all of the old Size Class 1. Examples: System/32, Burroughs B 80, DEC Datasystem 300/500, Basic/Four.

- Minicomputers are those processors made by DEC, Data General, etc. that cater to OEMs, sophisticated large users, and dedicated-application markets.

- Other computers/processors are systems -- many just beginning to emerge -- that don't fit other categories. These include intelligent terminals operating standalone, clustered terminal systems, etc.

The relationships between the divisions of the installed base are shown in the chart above. It is important to note that minicomputers overlap the other segments . . . thus, care must be exercised in comparing charts or figures and forecasts from previous issues of the EDP/IR.

In 1976, general-purpose computers accounted for $5.23 billion worth of shipments in the U.S., $5.29 billion overseas. Small business computers will tally $415 million worth of U.S. shipments, $205 million overseas. Minicomputers and other systems will pass $1.2 billion in U.S. shipments, $565 million overseas. By 1981, general-purpose computer, small business computer, and minicomputer and other system shipments will grow by factors of 1.6, 3.0, and 2.5 respectively.

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WORLDWIDE GENERAL-PURPOSE COMPUTER MARKET FOR U.S.-BASED MANUFACTURERS
(Copyright 1977 by International Data Corporation)

	1976 Shipments:		In Use Yearend 1976:		
	$M	% Total	$B	% Total	1975-76 Change
IBM	7,200	66.1%			
Plug-Compat.	650	6.0			
Amdahl	115	1.1			
IBM Systems	7,965	73.2%	47.9	70.6%	+ 11.2%
Sperry Univac	790	7.3%	5.3	7.8%	+ 12.1%
Burroughs	700	6.4	4.0	5.9	+ 16.5
HIS	680*	6.2	5.3	7.8	+ 7.0
NCR	340	3.1	1.6	2.3	+ 9.0
CDC	265	2.6	2.4	3.5	+ 8.6
DEC	135+	1.2	.5	.7	+ 43.0
Cray	10	-	-	-	-
SUBTOTAL	2,920	26.8	20.0	29.4	+ 11.1
TOTAL	$10,885*+	100.0	67.9	100.0	+ 11.2%

* Does not include over $100 million in HIS minicomputer revenues
\+ Does not include over $700 million in DEC minicomputer revenues

*+ Total includes $370M in small business computers.

GENERAL-PURPOSE SHIPMENTS LEVEL FOR 1976, FORECAST TO RISE IN 1977
WORLDWIDE INSTALLED BASE EXPECTED TO HIT $100 BILLION BY 1981

New-built shipments of U.S.-made general-purpose computers hit $10.5 billion last year, up only 1% from 1975's $10.4 million and down 2% from 1974's record of $10.7 billion. But, on the strength of IBM's new midrange 370s and their competitive rivals, shipments are expected to rise 8.4% this year to $11.4 billion. 1978 and 1979 are expected to show over-10% rates; shipments at the turn of the decade are expected to slow to an 8% annual growth rate.

On the international scene, the two-year trend of overseas computer shipments growing faster than domestic shipments is expected to reverse this year. In fact, 1976 is expected to be the only year this decade in which overseas shipments surpass U.S. shipments on a dollar value.

Furthermore, the net add to the installed base as a ratio of shipments is increasing in the U.S. and beginning to flatten overseas -- providing the worldwide base about 10% growth per year through 1980. Beginning with 1976, the overseas installed base will grow about as fast as the U.S. base.

Behind these shipment patterns lie several trends affecting the long-term and short-term outlook for the general-purpose computer market:

- Users are ready for new hardware. IDC surveys show the average medium/large-scale IBM site using its computer 15 out of 21 shifts a week. New price/performance levels should add to acquisition incentive.

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COMPUTER MARKET SUMMARY -- U.S.-BASED MANUFACTURERS				
	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1974	69,300	263,000	$ 11,920	$ 58.5
1975	75,700	327,200	12,050	67.1
1976	96,150	403,400	$ 12,810	$ 75.9
1977	121,500	507,500	$ 14,510	$ 85.7
1978	149,200	635,500	16,790	96.8
1979	177,000	789,500	19,100	109.3
1980	210,800	972,400	21,260	123.2
1981	245,600	1,180,600	$ 23,610	$ 138.6
		UNITED STATES		
1974	47,500	179,900	$ 7,040	$ 33.6
1975	50,800	220,200	6,480	38.0
1976	65,900	270,600	$ 6,710	$ 42.9
1977	83,950	336,800	$ 8,060	$ 48.4
1978	103,300	418,500	9,520	54.7
1979	121,800	513,800	10,960	61.7
1980	146,200	627,000	12,340	69.6
1981	171,800	755,000	$ 13,770	$ 78.2
		INTERNATIONAL		
1974	21,800	83,100	$ 4,880	$ 24.9
1975	24,900	107,000	5,570	29.1
1976	30,250	132,800	$ 6,100	$ 33.0
1977	37,550	170,700	$ 6,450	$ 37.3
1978	45,900	217,000	7,270	42.1
1979	55,200	275,700	8,140	47.6
1980	64,600	345,400	8,920	53.6
1981	73,800	425,600	$ 9,840	$ 60.4

This is the total of all general-purpose computers, minis, small business computers (SBCs), and "other" systems such as IBM's S/7. Efforts have been made to eliminate double counting (e.g., minis used in SBCs). Details on the three major types of computers are found in tables elsewhere in this issue. Note that the general-purpose and SBC tables are mutually exclusive, but the minicomputer table includes computers subsequently shipped to users -- by the minimakers themselves or by systems houses -- as small business computers.

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- New rounds of applications are ready for implementation. Data base management systems, on-line processing, telecommunications hookups -- all are adding to the demand for more systems/capacity.

- The international market is maturing. Retirements are beginning to whittle the net add/shipment ratio toward that of the U.S. By size class, the overseas distribution of installed base is similar to the domestic base -- with a slight bulge in the medium-scale systems.

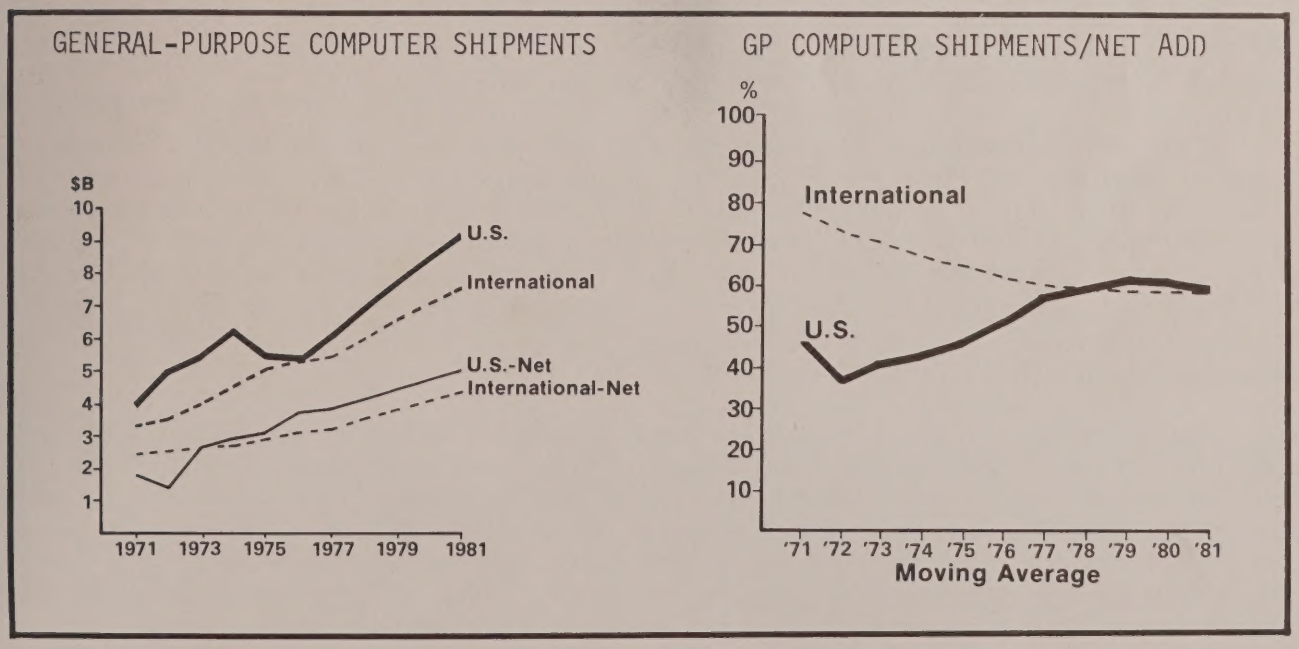
- Equipment rental is waning in popularity. In 1976 rental accounted for only 37% of all U.S. computer acquisitions, purchase accounted for 40%. The international mix was higher -- 60% rental -- but dropping.

While some of the trends are generic, representing the increasing sophistication of users and the penetration of information processing into all aspects of our daily lives . . . some are influenced by vendor policy, primarily IBM's. For the last several years IBM has been repricing its equipment -- and competitors have been responding -- to encourage purchase and lease . . . either to clear the shelves for a new round of computers, or to nudge the industry toward a capital goods orientation. The latter would allow more frequent insertions of technology into product lines . . . and probably mandate unbundling.

Mainframer review

If 1976 was a year of building for the industry, perhaps nowhere was it as apparent as in the market for general-purpose computers. With slower-rolling product cycles than other segments of the EDP industry, it's significant that no less than three new product lines were established (counting IBM's 138 and 148 as part of a new line). Moreover, a whole new concept in computer systems -- the plug-compatible CPU -- was brought to fruition. A rundown of major events:

Burroughs introduced its new "800" Series of computers, including the B 800, 1800, 2800, 3800, 4800, and highly-modular 6800. More recently, the company introduced the behemoth 7800 and "Burroughs Scientific Processor," what the Detroit mainframer calls the first "total system" in the super computer class. Besides



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introducing the models, Burroughs also repriced them during the year . . . in response, most observers say, to IBM actions. Burroughs also introduced its B 80 small business computer. . . . and continued to show higher-than-average profit margins and customer loyalty.

Control Data, though garnering more and more of its revenues from computer services, rekindled its mainframe flame with the introduction of a new super computer -- the Star 100 -- and two new Cyber 170s unveiled this month. (The Cyber 171 is said to be comparable to a 370/148; the Cyber 176 is said to be 3-4 times as powerful as a 168.) Thanks to its computer services business and acceptance of the Cyber 170s, CDC's earnings picture is brighter than it's been for years.

DEC strengthened its bid for general-purpose mainframe revenues by making its timesharing/networking prowess available to a wider array of users with the DECsystem-20 (Model 2040), a smaller version of the DECsystem-10. DEC also enhanced the batch processing capabilities of its systems, and later announced a new top of the line (Model 1090) and bigger DECsystem-20 (Model 2050).

Honeywell had a big year . . . beefing up its Series 60 with memory and performance enhancements, enhancing its Level 6 minis and incorporating them in other other EDP products, unveiling a new top of the line (66/85), and announcing its "Distributed Systems Environment" answer to IBM's SNA. Like others, however, HIS found itself adjusting prices when IBM announced the 138/148. The company also restructured its domestic operations and began melding the Xerox and CII product lines into its own. Honeywell's other business -- industrial controls -- also did well . . . thanks to the cold winter and new energy conservation "consciousness."

IBM dominated the news last year, making major announcements on virtually all fronts. The most impressive, of course, were the new 370s -- the 138, 148, 3033, and 158 and 168 Attached Processors. But perhaps even more stunning in the long run are the series of memory price cuts -- the latest occurred just last week -- that have brought the price of memory in DPD products to 11¢ a byte, in GSD gear even lower. Other announcements were also instrumental in fleshing out an environment for the next round of major products . . . networking enhancements to SNA, more MVS software, and partial unbundling of the operating system and utilities. And IBM moves in the minicomputer and office systems arena leave little doubt that the company intends to maintain its double-digit revenue growth in part by culling dollars from areas not strictly confined to the EDP room.

NCR's general-purpose computer thrust came with the announcement of a new computer family, the "Criterion" Series, which marked the start of the company's first full year out of the electromechanical cash register business and reaffirmed its commitment to mainframes. Announcements planned for next week should expand the currently-sparse product line and establish NCR's posture toward a networking architecture. In other areas, NCR continued its bid for supremacy in the auto-transaction market . . . copping the lion's share of business in POS terminals and introducing the first "second generation" POS system.

Sperry Univac, while not quite announcing a new line of computers, added to both the Series 90 and Series 1100 sides of its product family with the 90/80, 1100/80, and 90/25. (The company also repriced the 90/60, 90/70, and memory on the 90/80 when IBM announced the 138/148.) Significantly, the company also put a tag on its network architecture -- "Distributed Communications Architecture" -- and announced the first product under its aegis, TELCON. Last but not least, the company finally announced a small business computer, the BC 7.

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IBM ON THE RAMPAGE? . . .

. . . is what some of IBM competitors might well be asking these days. Look at the record. Last May the Giant cut memory purchase prices on its 370s by 30%, running the price down to $170,000 per megabyte. In July the 138 and 148 were announced -- at the lower price/byte memory and with lower CPU prices than their predecessors -- and eight months later memory prices on the 158 and 168 were lowered again, to $110,000 per megabyte. Purchase prices were also lowered on the CPUs and the 3033 was announced . . . with more performance at less cost than a 168-3.

Two weeks later IBM lowered 115 and 125 rental, lease, and purchase prices by 20%; 135 and 145 purchase prices by 20% and main memory increments by 35%. Purchase prices on 3330 and 3333 disk systems were lowered 15%.

If that's not enough, just before announcing the System/34 and new software for the Series/1, IBM's GSD lowered most of its prices . . . until now one version of the Series/1 comes with memory increments priced at 7.4¢ a byte.

Observers divide into three camps . . . those that see IBM's actions as a "fire sale" to get the user base ready for new CPUs, those that see IBM's actions as part of a "stop Amdahl" operation, and those that go both ways. In fact, though, the biggest immediate impact may be on used computer dealers and third-party lessors . . . as residual values for older 370s drop. Add-on memory makers will also have a smaller price umbrella under which to operate, but some claim that the lower residual values will work to their advantage . . . as resale value becomes less a factor in user acquisition decisions.

What it points to is unbundling (and back around to the plug-compatible CPU vendors?). As software emerges from the blanket of total system pricing, the technological edge held by hardware-only vendors wanes. With software paying its own way and less of a rental base to protect, IBM should be able to compete chip for chip with other mainframers, PCMs, semiconductor houses, and foreign competitors. A diffused IBM, in fact, would be an awesome competitor.

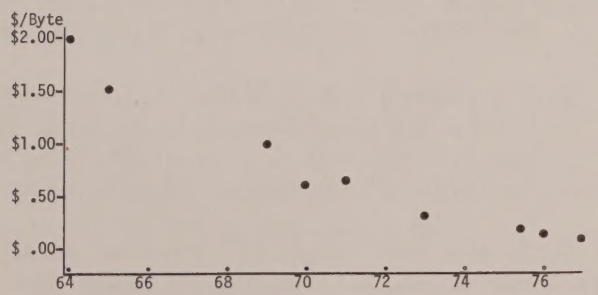
Meanwhile as the industry moves toward a capital goods orientation, IBM extends its tentacles in a variety of directions . . . data communications, minicomputers, and soon, perhaps, computer services.

\+ + + +

IBM MEMORY PRICE HISTORY

Model	Date	$/Byte
360/30	1964	$2.00
360/65	1965	1.50
S/3-10	1969	1.00
370/155	1970	.60
370/135	1971	.64
370/115	1973	.30
5100	9/75	.18
158/168 cut	5/76	.17
Series/1	11/76	.12
3033	3/77	.11
Series/1 cut	4/77	.07

Memory Curve



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Plug-compatible computers

The PCM computer makers are in a category by themselves. Amdahl announced its 470V6 in the fall of 1975 and proved at least the short term viability of the concept by operating the first year in the black and placing 33 systems by yearend 1976. Itel got into the act last October with two midrange systems aimed at IBM's 145, 148, and 158 base. And there may be more to come: IPL Systems has shipped two production models of a 145/148-size plug-compatible CPU to Control Data.

More significant than their initial announcements will be the PCM-CPU makers' ability to withstand IBM's reactions. Amdahl and Itel both claim to have foreseen the introduction of such systems as the 158 and 168 Attached Processors and the new 3033. Though the severity of IBM's recent memory and CPU price cuts may have surprised them a bit, some sort of move by IBM was widely predicted. Since then:

- Amdahl announced a new version of its V6 and two new models that bracket it in the line. With the new models Amdahl keeps the same price/performance relationship with IBM's repriced products it had before the IBM price cuts. Fully-configured V6 and V5 CPUs cost about the same as their IBM equivalents -- but without power supply, console, and channels -- while the V7 dwarfs anything in IBM's uniprocessor line.

- Itel, which claims to be ready for a 370/158 replacement later this year, has not repriced its systems . . . but is rumored to be readying a smaller system (145-size?) to expand its line.

The price performance curve

With the 138/148, IBM ushered in a new level of "bang for the buck," knocking CPU and memory prices below predecessors of lesser performance. When the 370 replaced the 360, users were offered 60% more power and double the memory for 25% more money, 3.5 times the power and four times the memory for 2.25 times as much. But with the 138/148, upgrading users can get 30% more power and double the memory for 25% less money, while 2.5 times the power and quadruple the memory costs only 60% more. These new price performance levels have resulted in:

- Accelerated midrange computer acquisitions. IDC pre-138/148 surveys of user migration plans showed 85%-90% of 135 and 145 users had no plans in 1976 to change CPUs. Now about 50% want to make a switch. (In fact, backlog and interest in the 138/148 run so high that a market now exists in "futures" . . . or position in the delivery queue.)

- Lower prices from competitors. Univac and Burroughs, for instance, repriced their lines within weeks of IBM's announcement. Products yet to be announced -- mainframes, add-on memory, etc. -- will have to take IBM's new price "standards" into account.

- New pressure to unbundle. Systems manufacturers will be encouraged to let hardware prices follow semiconductor costs and software begin paying its own way . . . incentive, perhaps, for IBM to continue selling "solutions" on the one hand, start selling OEM equipment on the other.

With the new "eights," cheaper memory, and marked-down 370s now on the block, users have fresh motivation to prime the IBM pump -- as shipment forecasts show. For some that's good news, for others it may mean pruning profit margins.

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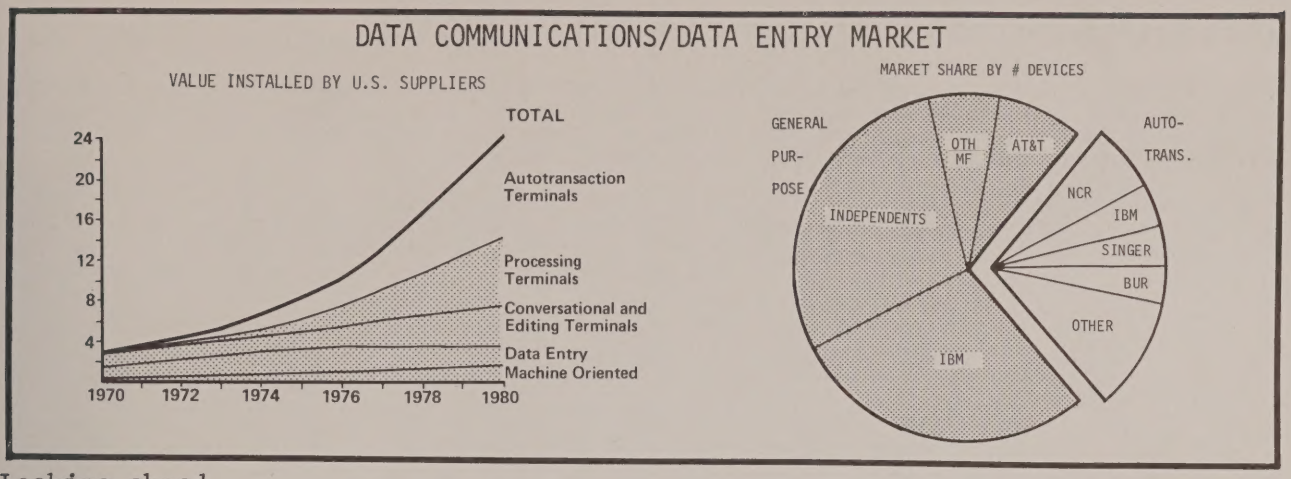

Looking ahead

Other winds blow across the computer industry . . . and as communications and computing technologies and markets converge, users are changing the way they use computers, and these changes are being translated into the marketplace:

- General-purpose datacomm terminals/data entry devices will show cumulative U.S. shipments of $9 billion in the next five years. As of 12/76, IDC counted 1,300,000 devices in the U.S. worth $8 billion.

- Another $2 billion -- 500,000 devices -- of autotransaction devices (automated teller machines, retail POS terminals, etc.) were in place as of yearend with a 40% annual growth rate forecast for the next 5 years.

- Spending for data communications hardware, up 38% in 1976, was over $900 million last year in the U.S.; spending on communications line charges was $1.7 billion, up 22% from the year before.

Despite such attractive growth rates for datacomm products and services, the market is still cloudy . . . primarily because of the confusion caused as a regulated industry collides with an unregulated one. By 1981, however -- after the FCC's second Computer Inquiry and perhaps a Congressional rewrite of the communications laws -- some of these clouds may dissipate. By then IBM's SBS subsidiary should be operating and its Systems Network Architecture well-defined . . . as will be competing services and products from the other giant, AT&T.

Meanwhile, as computers land in networks, processing power gets distributed, and semiconductor production economies continue their relentless pressure on hardware costs, certain trends are bound to affect the computer industry as a whole:

- Storage costs will drop and new devices made available; equipment geared for on-line or application-unique use will prosper.

- New products, services, and pricing schemes will come into existence, perhaps through unbundling or the offering of hybrid services.

- Outside forces -- courts, legislators, consumer opinion -- will exert even more pressure on an industry used to going its own way.

Prognosis for the general-purpose computer market and its suppliers: a typically hectic, confusing, but bullish closeout of the decade.

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GENERAL-PURPOSE COMPUTER CENSUS

Counts in the General-Purpose Computer Census are based on the best information available to IDC -- but are estimates nevertheless. Computer makers, as a rule, do not directly supply this type of data. General-purpose computers -- as characterized by IBM's 370 family and competitors -- comprise the bulk of digital computers by value. They are primarily byte or character oriented and programmed in higher-level language.

Size classes are based on IBM 370s -- instead of constantly shifting average system values -- and which of a of a maker's models competes with which IBM machine, e.g. a computer in Size Class 7 would compete with an IBM 168 or 165. (Other classes can be checked under IBM's column.) Size Class 1 computers have been deleted from this census and included in the SBC Census. An "x" in the last column means not on order from the original manufacturer.

AS OF JANUARY 1, 1977

NAME OF MANUFACTURER	CLASS	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Amdahl	7	470 V/6	$106,000	6/75	26	7	33	50
Burroughs	3	B-200		11/61				X
	3	B-300	$ 6,500	7/65	525	350	875	X
	3	B-500		11/68				X
	2	B-70X/71X	$ 1,450	3/73	1,650	725	2,375	1,500
	2	B-72X/73X		4/75				
	2	B-1712/14/16/18	$ 2,500	8/72	1,060	625	1,685	
	2	B-1710 Series		12/75				500
	3	B-1726/26/28	$ 7,100	2/73	350	155	505	
	3	B-1800	$ 6,400	5/77	0	0	0	
	4	B-2500	$ 9,700	2/67	74	90	164	X
	4	B-2700	$ 9,700	8/72	355	165	520	X
	4	B-2800	$ 15,000	1/77	0	0	0	100
	4	B-3500	$ 17,700	5/67	410	310	720	X
	4	B-3700	$ 25,000	11/72	300	210	510	X
	4	B-3800	$ 19,000	1/77	0	0	0	150
	5	B-45/4700	$ 29,500	10/71	325	120	445	X
	5	B-4800	$ 35,000	9/76	5	5	10	75
	5	B-5500	$ 35,000	3/63	52	17	69	X
	5	B-5700	$ 32,000	12/70	15	10	25	X
	6	B-6700	$ 63,000	11/69	125	95	220	X
	6	B-6800	$ 46,500	3/77	0	0	0	75
	7	B-7700	$136,000	8/73	23	4	27	10
		Totals			5,269	2,881	8,150	2,410
CDC	4	Cyber-71	$ 19,800	7/76	1	2	3	10
	4	G-20	$ 19,600	4/61	3	-	3	X
	6	1604/A/B	$ 42,000	1/60	10	-	10	X
	4	31/3150	$ 9,800	12/64	51	30	81	X
	5	3170	$ 21,500	12/70	12	14	26	X
	4	3200	$ 14,700	5/64	34	29	63	X
	5	3300	$ 33,000	9/65	93	74	167	X
	5	3400	$ 23,700	11/64	3	4	7	X
	5	3500	$ 30,000	1/69	19	15	34	X
	6	3600	$ 49,000	6/63	15	15	30	X
	6	3800	$ 57,000	12/65	14	2	16	X
	6	6200	$ 42,000	11/70	-	4	4	X
	5	Cyber-72	$ 39,000	10/71	27	67	94	X
	6	Cyber-172	$ 46,000	7/75	5	34	39	30
	6	6400	$ 60,000	5/66	52	51	103	X
	6	Cyber-73	$ 56,000	3/72	28	50	78	X
	6	Cyber-173	$ 75,000	9/75	4	27	31	35
	6	6500	$ 82,000	12/67	17	15	32	X
	7	6600	$120,000	8/64	51	30	81	X
	7	Cyber-74	$130,000	3/72	12	11	23	X
	6	Cyber-174	$ 87,000	9/75	4	1	5	5
	7	Cyber-175	$150,000	8/75	2	2	4	5
	7	Cyber-76	$178,000	3/72	4	8	12	2
	7	7600	$185,000	1/69	22	9	31	X
	7	6700	$135,000	7/70	2	-	2	X
	7	Star-100	$270,000	12/74	4	-	4	0
		Totals			489	494	983	87
DEC	4	2040	$ 10,000	6/76	25	33	58	200
	4	2050	$ 18,800	1/77	-	-	-	
	4	PDP-6	$ 10,000	10/64	7	4	11	X
	4	1040/50/55	$ 16,200	10/67	185	150	335	X
	5	1060/70/77	$ 18,400	6/72	110	85	195	50
	6	1080/88/90	$ 26,500	6/75	40	20	60	40
		Totals			367	292	659	290
Honeywell	2	G-5X Series	$ 1,750	8/70	305	1,490	1,795	X
	3	G-100 Series	$ 4,700	4/66	110	960	1,070	X
	4	G-200 Series	$ 10,000	4/61	130	31	161	X
	4	G-400 Series	$ 16,000	5/64	200	250	450	X
	6	G-615/25/35/45	$ 78,000	4/65	42	31	73	X
	5	G-6025	$ 30,000	11/73	33	30	63	X
	5	G-6030/40	$ 40,500	6/71	57	135	192	X
	6	G-6050/60	$ 66,000	7/71	115	65	180	X
	6	G-6070/80	$103,000	7/71	45	26	71	X
	7	G-6180	$103,000	2/74	2	0	2	X
	2	Gamma 10	$ 2,500	7/64	-	850	850	X
	4	Gamma 30	$ 10,000	2/62	-	81	81	X
		G-Subtotals			1,039	3,949	4,988	X
	3	H-105/115	$ 6,200	3/70	380	330	710	X
	3	H-110/120	$ 5,100	1/66	155	145	300	X
	4	H-125	$ 8,300	12/67	28	165	193	X
	3	H-200	$ 7,500	3/64	305	150	455	X
	3	H-2020	$ 3,600	2/73	560	145	705	X
	3	H-2030	$ 5,700	1/73	125	58	183	X
	4	H-2040	$ 12,400	4/72	295	135	430	X
	4	H-1015	$ 13,900	4/71	34	28	62	X
	4	H-2050	$ 18,700	4/72	135	105	240	X
	4	H-12/1250	$ 14,000	2/66	260	105	365	X
	4	H-2015	$ 20,500	2/71	44	35	79	X
	4	H-2060	$ 19,500	4/72	49	24	73	X
	4	H-2200	$ 19,000	1/66	110	38	148	X
	5	H-2070	$ 32,500	5/72	48	2	50	X
	5	H-3200	$ 27,000	2/70	100	33	133	X
	5	H-4200	$ 44,000	9/68	14	2	16	X
	6	H-8200	$ 71,000	2/69	14	5	19	X
	4	H-8/1400	$ 14,000	12/61	12	17	29	X
	5	H-8/1800	$ 35,000	12/60	20	13	33	X
		H-Subtotals			2,688	1,535	4,223	X
	2	H-61/58	$ 2,100	6/74	79	560	639	600
	2	61/60	$ 3,100	6/74	57	610	667	
	3	62/40	$ 4,100	10/74	130	125	255	250
	3	62/60	$ 5,300	10/74	53	125	178	
	4	64/20	$ 9,200	10/74	82	210	292	175
	4	64/40	$ 13,200	10/74	16	63	79	
	4	66/05	$ 16,300	10/76	2	3	5	30
	4	66/07	$ 19,100	3/77	-	-	-	
	5	66/10	$ 25,500	6/75	24	25	49	50
	5	66/17	$ 25,500	2/77	-	-	-	
	5	66/20	$ 36,000	11/74	59	85	144	50
	5	66/27	$ 35,000	3/77	-	-	-	
	6	66/40	$ 60,000	10/74	18	33	51	20
	6	66/60	$ 85,000	10/74	25	11	36	
	7	66/80	$107,000	10/74	11	3	14	25
	7	68/80	$ 95,000	10/74	2	-	2	
		S-60 Subtotals			558	1,853	2,411	1,200
		HIS Totals			4,285	7,337	11,622	1,200

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IBM	2	System/3-4	$ 1,250	6/76	150	20	170	300
	2	System/3-6	$ 1,700	12/70	1,750	1,270	3,020	X
	2	System/3-8	$ 2,100	6/75	3,800	3,100	6,900	2,000
	2	System/3-10	$ 2,500	1/70	12,250	7,350	19,600	X
	3	System/3-12	$ 3,600	3/76	2,230	950	3,180	3,000
	3	System/3-15	$ 6,500	3/74	2,770	1,170	3,940	700
		Subtotals			22,950	13,860	36,810	6,000
	3	370/115	$ 8,400	4/74	1,320	2,300	3,620	100
	4	370/125	$ 12,000	6/73	1,290	2,170	3,460	X
	4	370/135	$ 19,100	5/72	2,460	2,850	5,310	X
	4	370/138	$ 19,400	11/76	30	20	50	2,250
	5	370/145	$ 36,500	7/71	1,820	1,690	3,510	X
	5	370/148	$ 35,500	3/77	-	-	-	1,500
	6	370/155	$ 67,000	2/71	530	415	945	X
	6	370/158	$ 95,000	5/73	1,280	1,150	2,430	350
	7	370/165	$123,000	6/71	120	63	183	X
	7	370/168	$177,000	7/73	415	240	655	150
	7	370/195	$260,000	3/71	14	4	18	X
		Subtotals			9,279	10,902	20,181	4,350
	3	360/20	$ 2,800	12/65	1,440	3,050	4,490	X
	3	360/22	$ 3,600	7/71	175	160	335	X
	3	360/25	$ 8,000	10/68	150	730	880	X
	4	360/30	$ 10,900	6/65	2,080	1,370	3,450	X
	4	360/44	$ 18,100	7/66	44	54	98	X
	4	360/40	$ 18,400	6/65	1,180	1,250	2,430	X
	5	360/50	$ 32,500	8/65	530	395	925	X
	6	360/65	$ 69,000	11/65	410	215	625	X
	7	360/67	$142,000	6/66	23	16	39	X
	7	360/75	$118,000	1/66	25	17	42	X
	7	360/85	$178,000	10/69	1	1	2	X
	7	360/9X	$191,000	11/67	12	5	17	X
		Subtotals			6,070	7,263	13,333	X
	2	1130	$ 2,500	2/66	1,700	1,490	3,190	X
	3	1401	$ 3,700	9/60	620	660	1,280	X
	2	1401-G	$ 2,400	5/64	20	15	35	X
	2	1401-H	$ 1,750	6/67	5	13	18	X
	4	1410	$ 17,100	11/61	52	39	91	X
	3	1440	$ 4,700	4/63	90	140	230	X
	4	1460	$ 10,000	10/63	19	20	39	X
	3	1620	$ 2,700	9/60	140	125	265	X
	5	7010	$ 25,500	10/63	6	3	9	X
	7	7030	$160,000	5/61	2	1	3	X
	5	7040/44	$ 30,000	6/63	13	20	33	X
	5	7070/74	$ 27,000	3/60	96	22	118	X
	6	7080	$ 60,000	8/61	32	-	32	X
	6	7090/94	$ 71,000	8/60	40	11	51	X
		Subtotals			2,835	2,559	5,394	X
		Totals			41,134	34,584	75,718	10,350
NCR	3	Criterion 8550	$ 9,700	4/76	40	15	55	300
	4	Criterion 8570	$ 15,200	5/76	5	1	6	100
	2	Century-50	$ 2,100	2/71	590	40	630	X
	3	Century-100	$ 3,100	9/68	460	740	1200	X
	2	Century-75	]	7/76	]	]	]	]
	3	Century-101	] $ 3,800	10/72	] 1,160	] 700	] 1,860	] 100
	3	Century-151	$ 4,800	2/75	275	75	350	150
	4	Century-200	$ 7,300	9/69	355	430	785	X
	4	Century-201	$ 10,500	8/74	285	105	390	X
	4	Century-251	$ 18,600	11/73	85	70	155	X
	5	Century-300	$ 24,000	2/72	90	75	165	20
	3	315	$ 3,400	5/62	110	165	275	X
	4	315-RMC	$ 10,300	9/65	19	20	39	X
		Totals			3,474	2,436	5,910	670
Singer	2	System 10	$ 2,600	10/70	1,650	1,250	2,900	X
Sperry-Univac	4	III	$ 27,000	8/62	88	33	121	X
	3	SS-80/90	$ 8,500	8/58	2	6	8	X
	4	418 I/II	$ 12,000	6/63	52	55	107	X
	4	418 III	$ 41,500	6/69	48	90	138	X
	5	491/492	$ 28,500	12/61	13	10	23	X
	6	494	$ 80,000	2/66	66	58	124	X
	2	1004	$ 1,100	2/63	335	335	670	X
	2	1005	$ 1,900	4/66	280	94	374	X
	3	1050	$ 9,300	9/63	135	85	220	X
	6	1106	$ 44,500	12/69	90	225	315	X
	6	1107	$ 60,000	10/62	5	11	16	X
	7	1108	$ 87,000	9/65	160	98	258	X
	7	1110	$138,000	6/72	60	77	137	X
	2	9200	$ 2,200	6/67	695	690	1,385	X
	3	9300	$ 4,800	9/67	580	500	1,080	X
	4	9400	] $ 11,800	5/69	] 240	] 435	] 675	X
	4	9480	]	3/73	]	]	]	X
	3	90/30	$ 5,600	2/75	345	570	915	600
	4	90/60	$ 19,500	1/74	75	80	155	60
	5	90/70 (+9700)	$ 23,500	11/73	11	31	42	X
	5	90/80	$ 56,000	2/77	-	-	-	5
	5	1100/10	$ 31,000	4/76	19	8	27	50
	5	1100/20	$ 29,000	4/75	6	22	28	25
	6	1100/40	$ 73,000	7/75	7	22	29	30
	7	1100/80	$ 83,000	3/77	-	0	-	10
		Subtotals			3,312	3,535	6,847	780
	4	301	$ 6,900	10/60	54	5	59	X
	5	501	$ 16,600	6/59	6	-	6	X
	5	3301	$ 23,500	7/64	49	-	49	X
	3	Spectra 70/15	$ 4,400	9/65	5	-	5	X
	3	Spectra 70/25	$ 7,800	9/65	1	1	2	X
	4	Spectra 70/35	$ 13,800	1/67	65	2	67	X
	5	Spectra 70/45	$ 25,500	11/65	205	9	214	X
	5	Spectra 70/46	$ 43,000	11/68	37	1	38	X
	5	Spectra 70/55	$ 40,500	11/68	6	-	6	X
	6	Spectra 70/60	$ 47,500	9/70	25	-	25	X
	6	Spectra 70/61	$ 52,000	3/71	4	-	4	X
	3	Spectra 1600	$ 4,000	1/69	34	-	34	X
	4	Spectra 70/2	$ 13,300	7/71	44	-	44	X
	4	Spectra 70/3	$ 21,600	10/71	17	-	17	X
	6	Spectra 70/6	$ 35,000	10/71	38	-	38	X
	6	Spectra 70/7	$ 42,000	10/71	23	-	23	X
		Subtotals-R			613	18	631	X
		Totals			3,925	3,553	7,478	780
Xerox	4	Sigma 5	$ 14,000	8/67	130	28	158	X
	4	Sigma 6	$ 22,500	11/70	37	13	50	X
	5	Sigma 7	$ 27,000	12/66	58	10	68	X
	4	Sigma 8	$ 20,500	9/71	6	7	13	X
	6	Sigma 9	$ 50,000	11/71	65	26	91	X
	3	530	$ 3,800	8/73	110	38	148	X
	4	550/560	$ 13,400	11/74	36	4	40	X
	5	940	$ 26,000	4/66	45	3	48	X
	3	9300	$ 8,500	11/64	20	5	25	X
		TOTALS			507	134	641	X
		TOTALS			61,126	52,968	114,094	15,837

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GENERAL-PURPOSE COMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1974	16,400	111,800	$ 10,700	$ 54.2
1975	14,400	116,600	10,410	61.2
1976	15,500	114,100	$ 10,515	$ 68.0
1977	17,350	118,250	$ 11,400	$ 75.1
1978	17,450	122,600	12,840	82.7
1979	16,200	127,500	14,230	90.9
1980	15,500	132,200	15,400	99.6
1981	15,500	137,200	$ 16,600	$ 108.9
		UNITED STATES		
1974	8,900	61,800	$ 6,200	$ 30.2
1975	7,100	62,800	5,410	33.6
1976	8,000	61,150	$ 5,230	$ 37.3
1977	9,500	62,700	$ 6,000	$ 41.1
1978	9,200	64,700	6,900	45.2
1979	8,500	66,900	7,700	49.6
1980	8,000	69,200	8,400	54.3
1981	8,000	71,600	$ 9,100	$ 59.3
		INTERNATIONAL		
1974	7,500	50,000	$ 4,500	$ 24.0
1975	7,300	53,800	5,000	27.6
1976	7,500	52,950	$ 5,285	$ 30.7
1977	7,850	55,550	$ 5,400	$ 34.0
1978	8,250	57,900	5,940	37.5
1979	7,700	60,600	6,530	41.3
1980	7,500	63,000	7,000	45.3
1981	7,500	65,600	$ 7,500	$ 49.6

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MINICOMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1974	47,500	128,000	$ 940	$ 2.5
1975	51,900	179,900	1185	3.6
1976	63,800	243,700	$ 1590	$ 5.3
1977	84,000	325,400	$ 2200	$ 7.3
1978	107,000	428,800	2930	10.1
1979	135,000	558,000	3800	13.6
1980	165,000	714,000	4780	18.1
1981	200,000	900,000	$ 5930	$ 23.6
		UNITED STATES		
1974	34,700	100,800	$ 640	$ 2.0
1975	36,900	134,400	750	2.7
1976	46,600	176,300	$ 1035	$ 3.7
1977	61,000	228,800	$ 1470	$ 4.9
1978	77,000	293,800	1940	6.6
1979	95,000	372,200	2500	8.6
1980	115,000	464,700	3120	11.2
1981	140,000	574,000	$ 3830	$ 14.3
		INTERNATIONAL		
1974	12,800	27,200	$ 300	$ .5
1975	15,000	45,500	435	.9
1976	17,200	67,400	$ 555	$ 1.6
1977	23,000	96,600	$ 730	$ 2.4
1978	30,000	135,000	990	3.5
1979	40,000	185,800	1300	5.0
1980	50,000	249,300	1660	6.9
1981	60,000	326,000	$ 2100	$ 9.3

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U.S. MINIMAKERS' REVENUES JUMP 36% TO $1.9 BILLION AS IBM JOINS THE LINEUP WITH ITS SERIES/1

With shipments of 64,000 units in 1976 bringing U.S. minimaker revenues to within striking distance of $2 billion -- just two years earlier revenues cracked half that for the first time -- the bicentennial year was a good one. Growth that had dipped below 30% (lower for domestic shipments) during the recession sprang back to "normal" minicomputer levels . . . with domestic revenues topping $1 billion for the first time and attaining close to a 40% growth rate in 1976. By 1981, worldwide minicomputer revenues for U.S. suppliers should be more than $7.3 billion -- almost $5 billion in domestic revenues -- and the number of units shipped that year could easily surpass 200,000.

(These figures do not include the independent miniperipheral suppliers, who garnered $360 million in 1976 revenues, $90 million of which came from shipments to the minimakers. Industry growth rates that generally follow those of the minicomputer industry should lead to 1981 miniperipheral revenues over $650 million.)

Most of those units to be shipped in 1981 -- 70% or so -- will go to Original Equipment Manufacturers (OEMs) for use in other products, but almost two-thirds of revenues will come from end-user sales. While the fastest growing segment of the industry will be the micromini market -- leaping from nothing in 1974 to over $700 million in 1981 -- more significant growth will come in other areas:

- Services revenues, growing as the industry matures and builds its base, will provide over a fifth of minimaker revenues -- almost $1.5 billion.

WORLDWIDE MINICOMPUTER MARKET -- 1976 ACTIVITY
(Estimates of Units Shipped and $ Million Revenues; Copyright 1977 by IDC)

Company	Revenues	% Total	*75-76 Growth*	Units	% Total
Digital Equip.	$710	38%	*42%*	19,500	31%
Hewlett-Packard	304	16	*27*	5,500	9
Data General	179	10	*60*	6,800	11
HIS	112	6	*24*	1,600	2
General Auto.	79	4	*36*	3,750	6
Texas Instr.	58	3	*5*	3,000	5
Interdata	56	3	*30*	1,750	3
Varian	40	2	*5*	1,200	2
ModComp	38	2	*0*	650	1
Control Data	35	2	*17*	300	-
Computer Auto.	34	2	*36*	4,900	8
Microdata	34	2	*41*	1,880	3
Lockheed	23	1	*109*	1,265	2
Prime	23	1	*109*	460	1
SEL	23	1	*213*	150	-
Harris	20	1	*33*	250	-
DCC	18	1	*80*	3,500	5
Others	84	5	*14*	7,370	11
TOTALS	1,870	100%	*36%*	63,825	100%

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- Superminis like the PDP-11/70, Data General Eclipse, HP 3000, etc., will account for over 40% of revenues -- about $3.3 billion.

- Traditional minis will make up about 25% of revenues -- $1.9 billion.

(Note for statisticians: Because of the overlap between minicomputers and small business computers and end-user reshipments of minis overseas, the revenues of U.S. minimakers will not be congruent with the value of systems shipped.)

Enter the Giant

While the major minimakers jostled for their share of that 36% growth rate by adding new products and enhancing old ones, the real news for the year came out of Atlanta. Announcing the Series/1 in November, IBM's General Systems Division served notice that IBM would no longer ignore the fast-growing market for computers used as processing tools.

With the Series/1, though, IBM broke a few of its own internal conventions and a few of the minicomputer industry's . . . providing minimum software, offering no volume discounts, and marketing to sophisticated end users rather than the OEMs. IBM chose thereby to bypass the traditional minimaker avenue for building the high-volume production runs so important in the price-competitive mini world. More recently, GSD added PL/1 and FORTRAN capability, a real-time operating system, and four new CPU models to the line. Memory increments are now down to 7.4¢ a byte on one model; IDC's estimate of first year S/1 production is 1,000 units.

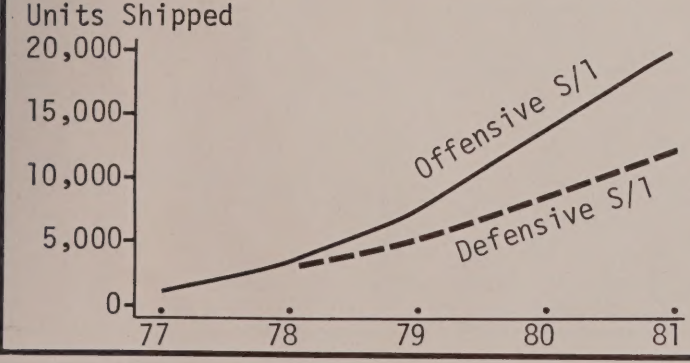
Will the Series/1 impact the other mininakers? Not exactly:

- IDC estimates the S/1's portion of minimaker revenues will grow from 2% in 1977 to about 17% by 1981, but

- Overall market forecasts, pegged at $6 billion in pre-S/1 estimates, have been expanded by almost a corresponding amount.

Thus, the mini industry as a whole is neither harmed nor hurt by IBM's entry. But there are ramifications beyond matters of revenue . . . where once the minimakers had to contend with IBM only indirectly in selling the concept of minicomputers, now they will have to contend with the Giant on a model-to-model basis. The market is liable to become a little less freewheeling now that users have a new standard for comparison . . . and as IBM's market share increases, others will necessarily decrease, perhaps unevenly.

IBM SERIES/1 FORECAST



IBM has both an offensive and defensive strategy available to it with the S/1. The later entails merely making the product available to those who want it. The former entails more support, software, memory, and peripherals, and use in other IBM products. Most analysts consider an offensive plan more likely.

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MINICOMPUTER CENSUS

The categorization of certain computers as "small business computers" is based on marketplace definitions as perceived by IDC. SBCs are those small general-purpose computers marketed by the major mainframers and their competitors to small business and first time users. They include offerings from the major mainframers (old Size Class 1 in the superceded Group A census); products such as DEC's Datasystem/300 from the minimakers aimed at commercial first time users; offerings from firms (like Qantel) that manufacture only SBCs; and offerings from companies that assemble systems from others' minis, such as Basic/Four did before beginning its own manufacturing operations.

Manufacturers with numbers or information that differs from that shown below are encouraged to contact Paul Arabasz, Census Editor, with more correct or updated information. All comments are appreciated.

AS OF JANUARY 1, 1977

NAME OF MANUFACTURER	COMPUTER MODEL	BITS PER WORD	PRICE CLASS	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED	ESTIMATED PRODUCTION NEXT 12 MO.
Artronix	PC-12/730	12	2	20		9/71	150	NA	150	NA
	PC-12/770	12	4	76		2/74	20	NA	20	NA
	Modulex	16	1	8		7/75	NA	NA	NA	NA
Century Computer Corp.	C-200	8	1	5	7	2/71	150	0	150	NA
Cincinnati Milacron	CIP/2000 Series	8	1	4	17	7/69	2,080	290	2,370	NA
	CIP/4000	16				12/76				NA
Compiler Systems, Inc.	CSI-16	16	1	11	20	11/70	80	10	90	NA
	CSI-24	24	2	15	30	12/70	35	5	40	NA
Computer Automation, Inc.	108/208/808	8	1	5	11	4/68	280	30	310	X
	116	16	1	8	16	8/70	200	50	250	X
	216	16	1	8	20	7/69	350	45	395	X
	816	16	1	10	15	12/68	40	5	45	X
	Alpha-8	8	1	3	4	5/72				X
	Naked Mini-8	8	1	2	3	5/72	3,720	996	4,716	X
	Alpha-16	16	1	4	9	10/71				NA
	Naked Mini-16	16	1	3	7	10/71				NA
	LSI-2/10, 2/20, 2/60	16	1	2	4	12/73	8,730	440	9,170	NA
	LSI-3/05	16	1	1	2	2/76	343	94	437	NA
	Subtotal						13,663	1,660	15,323	
Computer Talk, Inc.	CT-400	16	2	25	30	9/75	3	0	3	20
	CT-407	16	2	32	32	5/77	0	0	0	6
Control Data Corp.	1700	16+2	4	37	160	3/66				X
	1700-SC	16+2	3	20	60	9/70				X
	System 17	16+2	2	14	39	2/74	750	500	1,250	NA
	Cyber 18-10	16+2	2	14	40	/76				NA
	Cyber 18-20	16+2	3	16	75	/76				NA
	Cyber 18-30	16+2	4	110	116	9/76				NA
	Elbit-100	12	1	6	8	6/67	5	445	450	NA
Data General Corp.	Nova	16	1	6	12	2/69	750	620	1,370	X
	Micronova	16	1	2	7	11/76	35	15	50	NA
	Nova-2/4	16	1	3	6	10/73	2,350	910	3,260	NA
	Nova-2/10	16	1	5	9	10/73	1,900	880	2,780	NA
	Nova-3/4	16	1	2	4	1/76	710	240	950	NA
	Nova-3/12	16	1	12	19	1/76	225	75	300	NA
	Nova-3/D	16	2	12	39	10/76	5	0	5	NA
	Nova-800	16	1	7	36	3/71	1,435	335	1,770	X
	Nova-820	16	2	12	28	4/72	1,020	300	1,320	X
	Nova-840/830	16	2	16	43	7/73	1,030	285	1,315	NA
	Nova-1200	16	1	6	13	12/70	4,460	1,215	5,675	NA
	Nova-1210/1220	16	1	3	8	2/72	3,730	1,100	4,830	NA
	Nova-1230	16	1	6	12	12/71	360	110	470	NA
	Supernova	16	1	9	25	4/70	190	85	275	X
	Supernova-SC	16	2	16	30	6/71	220	110	330	X
	Eclipse-S/100	16	2	12	30	2/75	760	280	1,040	NA
	Eclipse-S/200	16	2	16	48	2/75	680	250	930	NA
	Eclipse-S/230	16	2	15	36	10/76	30	10	40	NA
	Eclipse-C/300	16	2	24	115	2/75	135	50	185	NA
	Eclipse-C/330	16	4	30	116	11/76	5	0	5	NA
	Subtotal						20,030	6,870	26,900	
(Digital Computer Controls)	D-112	12	1	3	12	8/70	930	170	1,100	NA
	D-116	16	1	5	7	11/71	7,200	1,300	8,500	NA
	D-216	16+2		3		/77	0	0	0	NA
	D-316	16+2		3		/77	0	0	0	NA
	D-416	16		3		9/75	95	15	110	NA
	D-616	16+2		7		9/75	13	2	15	NA
	Mod 5	16+2		3		2/76	65	10	75	NA
	Subtotal						8,303	1,497	9,800	
Datamate Computer Systems*	DM-16	16	2	17	26	11/69	12	0	12	X
	DM-70	16	1	9	15	12/70	25	0	25	X
	DM-70/ROM	16	1	4	6	10/70	NA	0	NA	X
	ECP-18	18	1	14	16	11/66	21	0	21	X
Datum	Enhancer E1/16	16	1	8	15	3/76	8	0	8	20
Digiac Corp.	3060		1	19	13	1/70	70	20	90	NA
	3080	25	1	20	25	12/64	14	2	16	X
Digital Equipment Corp.	DDP-8/a, e, f, m	12	1	4	12	4/71	19,070	8,480	27,550	NA
	PDP-8/i, l, s	12	2	8	27	5/65	5,765	3,685	9,450	X
	PDP-9, 9L	18	2	35	50	12/66	290	160	450	X
	PDP-11/04, 05, 10, 15, 20	16	1	5	13	3/70	15,550	8,800	24,350	NA
	PDP-11/34, 35, 40	16	2	9	30	1/73	5,950	2,800	8,750	NA
	PDP-11/45, 50, 55	16	3	24	80	4/72	2,150	850	3,000	NA
	PDP-11/70	16	4	60	100	7/75	920	180	1,100	NA
	LSI-11, PDP-11/03	16	1	2	3	6/75	4,150	600	4,750	NA
	PDP-12	12	2	13	45	4/69	510	255	765	X
	PDP-15, XVM	18	3	15	75	2/70	550	305	855	NA
	Subtotal						54,905	26,115	81,020	
Digital Scientific Corp.	Meta-4	16	3	29	90	4/70	140	15	155	NA
Electronic Associates, Inc.	Pacer-100	16	2	15	40	5/72	125	100	225	NA
Foto-Mem, Inc.*	Centaur-100	8	1	6	20	4/70	25	0	25	NA
General Automation, Inc.	GA-18/30	16	2	18	50	7/69	620	140	760	X
	SPC-12	8	1	4	16	1/68	4,150	950	5,100	Neg.
	SPC-16	16	1	5	25	5/70	7,500	4,500	12,000	2,000
	16/110	16	1	1	2	12/75	50	0	50	300
	16/220	16	1	2	3	1/76	450	50	500	1,000
	16/330	16	1	3	10	1/76	425	25	450	500
	16/440	16	1	9	25	7/75	700	300	1,000	800
	Subtotal						13,895	5,965	19,860	
GRI Computer	909 Series	16	1	4	9	1/70	320	150	470	X
	99/30	16	1	5	15	6/72	450	205	655	NA
	99/40	16	1	6	17	6/72	117	68	185	NA
	99/10	16	1	3	5	6/72	18	0	18	NA
	Subtotal						905	423	1,328	
GT&E (Tempo)	I	16	2	14	36	1/70	90	30	120	NA
	II	16	1	6	10	6/72	40	20	60	NA
Harris	6024/1	24	4	69	135	5/69	22	0	22	X
	6024/3	24	3	49	90	2/70	119	0	119	X
	Slash 4	24	4	24	110	8/73	180	15	195	40
	Salsh 5	24	3	16	50	5/72	330	15	345	35
	Slash 6	24	3	20	70	12/76	4	0	4	60
	Slash 7	24	4	45	180	10/75	14	1	15	10
	Series 100	24	4	85	160	10/75	33	7	40	35
	Series 200	24	4	179	240	10/75	18	2	20	20
	Subtotal						720	40	760	
Hewlett-Packard	2100A	16	1	7	15	6/71	7,700	3,300	11,000	200
	2100S	16	2	16	35	8/73	1,675	1,325	3,000	100
	2114-A/B	16	1	9	16	5/68	1,035	495	1,530	X
	2115-A	16	2	15	26	11/67	240	100	340	X
	2116-A/B/C	16	2	20	40	11/66	1,220	550	1,770	X
	2108-K	16	1	2	4	6/76	150	50	200	600
	21MX-M	16	1	4	15	6/74	4,500	2,000	6,500	2,200
	21MX-E	16	2	6	20	1/77	0	0	0	2,200
	3000	16	4	100	185	11/72	350	150	500	400
	3000-II	16	4	100	185	4/76				
	Subtotal						16,870	7,970	24,840	

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AS OF JANUARY 1, 1977

NAME OF MANUFACTURER	COMPUTER MODEL	BITS PER WORD	PRICE CLASS	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED	ESTIMATED PRODUCTION NEXT 12 MO.
HIS										
GE/PAC	30	8	2	7	35	5/69	225	50	275	X
	3010	16	3	13	90	5/70	25	1	26	X
	3010/2	16	4	15	140	12/71	NA	NA	NA	NA
Honeywell	112	12	1	5	10	11/69	222	48	270	X
	116	16	3		65	4/68	172	35	207	X
	316	16	2	8	45	6/69	1,300	715	2,015	X
	416	16	2	17	43	4/67	198	130	328	X
	516	16	3	24	95	10/66	735	415	1,150	X
	700 Series	16	3	16	65	6/72	1,650	1,300	2,950	300
	164X Series	16	4	144	440	12/69	20	8	28	X
	6/06	16	2	8	42	1/76				
	6/34	16	1	3	18	1/76	600	350	950	1,800
	6/36	16	2	8	35	1/76				
	6/43	16	2	10	45	1/77	0	0	0	240
	Subtotal-HIS						5,147	3,052	8,199	
Information Technology, Inc.	4900/5	8	1	3	5	10/70	NA	NA	NA	NA
	4900/10	16	1	10	20	10/65	25	0	25	X
Interdata	1	8	1	44	11	9/70	210	77	287	X
	2	16	1	11	14	7/68	14	0	14	X
	3	16	1	13	20	5/67	210	5	215	X
	4	16	1	9	21	8/68	320	132	452	X
	5	16	1	11	25	11/70	70	16	86	X
	13/15	16	2	22	35	9/69	12	7	19	X
	16/18	16	2	15	30	8/71	2	7	9	X
	50	16+1	1	7	19	4/72	43	13	56	X
	55	16+1	2	16	40	8/72	90	27	117	X
	70	16	3	9	65	12/71	1,030	327	1,357	50
	74	16	2	3	34	2/73	300	56	356	X
	80	16	2	15	44	7/72	70	18	88	X
	85	16	3	23	60	7/73				X
	5/16	16	1	1		/77	0	0	0	NA
	6/16	16	1	2	25	1/76	225	55	280	500
	7/16	16	2	3		2/74	2,375	408	2,783	1,000
	8/16	16	1	4		/77	0	0	0	NA
	7/32	32	3	10		7/74	415	83	498	200
	8/32	32	4	55	160	6/75	130	34	164	100
	Subtotal						5,516	1,265	6,781	
International Business Machines	Series/1	16	2	10	40	11/76	100	0	100	1,000
Keronix	IDS-16/8	16	1	3		4/74				NA
	IDS-16/10	16	1	3		4/74	500	0	500	NA
	IDS-16/12	16	1	3		4/74				NA
Lockheed Electronics Co., Inc.	LEC-16	16	1	11	22	3/69	480	55	535	X
	LEC-Jr	16	1	8	16	1/71	1,970	374	2,344	NA
	SUE-111X	16	1	6	10	9/72	1,920	311	2,231	NA
Microdata Corp.	400	8	1	3	4	1/70	155	0	155	X
	800/810/812/820	8	1	6	11	5/69	2,055	1,380	3,435	X
	1600	8	1	5	11	2/72	5,735	990	6,725	600
	3200/3230	16	1	8	14	3/74	100	100	200	50
	Micro One	8	1	1	3	11/74	800	120	920	X
	Subtotal						8,845	2,590	11,435	
MiniComp	MD-708	8	1	5	7	8/70	50	0	50	NA
Modular Computer Systems	Modcomp-I	16	1	2	9	10/71	640	140	780	NA
	Modcomp-II	16	1	4	40	3/71	1,015	315	1,330	NA
	Modcomp-III	16	2	13	44	12/70	70	5	75	X
	Modcomp-IV	16/32	3	19	100	5/74	160	75	235	NA
	Subtotal						1,885	535	2,420	
Motorola Communications Division	MDP-1000	8	1	8	19	2/69	75	0	75	X
Omnitec (BIT)*	480	8	1	6	17	12/66	195	3	198	X
	483	8	2	9	33	1/70	115	40	155	X
Prime Computer	100	16	1	4	11	4/73	207	397	604	NA
	200	16	1	6	35	11/72	220	59	279	NA
	300	16	3	12	56	9/73	180	141	321	NA
	400	16	4	50	132	6/76	28	9	37	NA
	Subtotal						635	606	1,241	
Raytheon Data Systems	703	16	1	13	23	10/66	179	33	212	X
	704	16	1	10	18	3/70	690	200	890	15
	706	16	2	19	30	5/69	75	17	92	X
	RDS-500	16	1	8	14	12/73	275	75	350	350
	Subtotal						1,219	325	1,544	
Redcor Corp.*	RC-70	16+2	2	15	30	7/68	100	40	140	X
Systems Computer Corp.*	500	8				6/72	NA	NA	NA	X
	1000	8	1	4		1/71	400	200	600	X
	1500	8				6/72	NA	NA	NA	X
Systems Engineering Laboratories	32/35	32	2	30	45	9/76	10	0	10	250
	32/55	32	3	50	95	8/75	150	25	175	200
	32/75	32	4	70	125	/77	0	0	0	150
Tandem Computers, Inc.	T16/213	16	4	90	150	5/76	16	1	17	50
	T16/243	16	4	90	150	9/76	8	3	11	75
Texas Instruments	960-A/B	16	2	14	30	6/70	2,900	1,200	4,100	NA
	980-A/B	16	2	17	40	5/68	3,150	1,350	4,500	NA
	990/4	16	1	8	10	6/76	420	180	600	NA
	990/10	16	2	20	30	3/76	350	150	500	NA
	Subtotal						6,820	2,880	9,700	
Unicom, Inc.*	CP-8A	8	1	3		2/70	105	55	160	X
	CP-8B	8	1	3		3/70	78	30	108	X
	CP-8C	8	1	5		3/70	130	70	200	X
	CP-8D	8	1	7		4/70	30	10	40	X
	Subtotal						343	165	508	
Unicomp*	Comp-16	16	2	11	29	6/70	26	0	26	X
	Comp-18	18	2	12	38	8/70	38	0	38	X
Varian	520i	16	1	6	13	9/68	330	170	500	X
	620/a	16	3		75	12/65	120	30	150	X
	620/f	17+1	1	11	25	6/70	170	80	250	X
	620/f-100	16	1	10	22	6/72	300	140	440	X
	620/i	16+2	1	10	20	12/65	920	380	1,300	X
	620/L&100c	16	1	5	12	2/71	720	320	1,040	X
	620/L-100	16	1	6	14	6/72	840	410	1,250	400
	R620/i, R622/i	16+2	2	15	29	6/69	155	65	220	
	V-72	16	2	10	45	2/74	600	270	870	150
	V-73	16	2	16	45	11/72	1,180	520	1,700	
	V-74	16	3	40		5/74	210	90	300	X
	V-75	16	3	39		8/75	120	50	170	X
	V-76	16	2	8		1/76	210	90	300	250
	V-77-200	16	1	2	5	1/77	0	0	0	
	V-77-400	16	1	5	19	12/76	10	0	10	1,500
	V-77-600	16	2	8	40	3/77	0	0	0	
	Subtotal						5,885	2,615	8,500	
Westinghouse Electric	F-50	14	1	16	23	8/64	182	40	222	X
	P-2000	16	2	10	27	8/69	111	90	201	NA
	2500	16	2	10	30	11/71	210	70	280	NA
Xerox*	CE-16, 16/A	16	1	8	23	6/69	35	10	45	X
	Sigma-2	16	4	24	125	12/66	170	80	250	X
TOTAL							176,315	67,352	243,667	

*Not currently active in new production of minicomputers.

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SMALL BUSINESS COMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1974	5,000	5,750	$ 200	$ .2
1975	10,000	15,750	400	.6
1976	20,000	35,750	$ 750	$ 1.4
1977	27,500	64,100	$ 1100	$ 2.5
1978	38,000	100,000	1400	3.8
1979	46,000	142,000	1680	5.2
1980	58,000	193,500	1950	6.9
1981	68,000	250,000	$ 2230	$ 8.7
		UNITED STATES		
1974	3,700	4,200	$ 150	$ .2
1975	7,500	11,700	300	.5
1976	13,500	25,200	$ 500	$ 1.0
1977	18,800	44,000	$ 750	$ 1.7
1978	26,200	69,000	950	2.6
1979	31,500	98,000	1150	3.6
1980	40,800	135,000	1350	4.8
1981	47,500	176,000	$ 1550	$ 6.1
		INTERNATIONAL		
1974	1,300	1,550	$ 50	$ -
1975	2,500	4,050	100	.1
1976	6,500	10,550	$ 250	$ .4
1977	8,700	20,100	$ 350	$ .8
1978	11,800	31,000	450	1.2
1979	14,500	44,000	530	1.6
1980	17,200	58,500	600	2.1
1981	20,500	74,000	$ 680	$ 2.6

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SMALL BUSINESS COMPUTER SHIPMENTS HIT $750 MILLION IN 1976 AS IBM'S S/32 AND OTHERS PRY OPEN FIRST TIME USER MARKETS

If it's not always clear when a small computer can be termed a "small business computer," it is clear when the market for such systems came into its own . . . with the advent of IBM's System/32. With over 10,000 systems installed by 12/76, IBM commands the market with almost a 30% share. Wang comes a close second with 24%; DEC and Basic/Four split another 19%. NCR holds 4%, while the remainder is divided by a host of minimakers and independent systems houses. (Counting only its B 80, Burroughs' share was 1%, but that will change as shipments crank up.)

With 300,000-500,000 small businesses in the U.S. alone, the market for SBCs is largely untapped. Those that do cater to it have discovered that selling to the first time user is a different ball of wax:

- First time users are uninformed about computers . . . the trade press doesn't reach them, and the array of products and vendors is confusing.
- Buying is usually done by company presidents and founders . . . and information needs are often idiosyncratic to the firm and individual.
- Service and reliability are probably the most important criteria concerning potential SBC buyers. Solutions count, not equipment.

IBM's relatively late entry into the SBC market may have irked some of the veteran vendors, but by helping initiate a whole new stratum of users, it will provide much of the momentum that will triple 1976 revenues ($750M) by 1981.

SMALL BUSINESS COMPUTER CENSUS

The categorization of certain computers as "minicomputers" is based on marketplace definitions as perceived by IDC. Minis are general-purpose in design but sold as tools, not just solutions; are available from the makers as complete systems, not just boards; are available to OEMs and usually discounted in volume buys; and are part of a family that has at least one product in the $2,000-$25,000 price range and comes with at least 4K RAM. Price classes are:

Price classes: (1) $25,000 (2) $25,000-$50-000 (4) $100,000 and up; Average System Value

Manufacturers with numbers or information that differs from that shown below are encouraged to contact Paul Arabasz, Census Editor, with more correct or updated information. All comments are appreciated.

AS OF JANUARY 1, 1977

NAME OF MANUFACTURER	COMPUTER MODEL	PROCESSOR MODEL	NOTES	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED	ESTIMATED PRODUCTION NEXT 12 MO.
Advanced Information Design	System 3000	Interdata 6/16,8/16		28		3/75	20	0	20	NA
	System 4000	Interdata 7/32,8/32		58		10/76	NA	0	NA	NA
American Management Systems, Inc.	AMS OE/IC	Nova-3		14		1/76	4	0	4	NA
Anderson-Jacobson, Inc.	1400	1400	a	16	22	1/70	260	15	275	20
	1500	1500		23		5/77	0	0	0	NA
Applied Data Processing, Inc.	Resource/100	Nova 3/12		39	62	6/76	9	0	9	37
Applied Digital Communications	101	Datapoint 1100		30		8/76	NA	NA	NA	NA
	201	Lockheed II or III		40		/77	NA	NA	NA	NA
	301	Varian V-76		50		1/75	4	0	4	NA
Applied Digital Technology	unnamed	SPC 16/45,16/65		50		1/72	10	0	10	NA
Ball Computer Products	DASL	Nova-2/10		38		6/75	3	0	3	NA
Basic/Four Corp.	350	Microdata, BFC 1300	b	34	34	9/71	190	)	)	75
	400	Microdata, BFC 1300	b	37	45	9/71	920	) 1600	) 3000	825
	500	Microdata, BFC 1300	b	39	50	9/71	100	)	)	X
	600	Microdata, BFC 1300	b	51	65	8/76	190	)	)	275
	700	BFC 1320		115		/77	0	0	0	160
Basic Timesharing, Inc.	4000/15	BTI 4020		36		1/76	NA	NA	NA	NA
	4000/25	BTI 4020		56		1/76	NA	NA	NA	NA
BDS Computer Corp.	BDS-3	PDP-11/03		8			NA	NA	NA	NA
Binary Data Systems	UCOM-1	Nova-3		40	60	/76	35	0	35	15
	UCOM-2	Dual Nova-3		95	120	/76	12	0	12	10
	UCOM-3	Eclipse		120	170	/76	2	0	2	2
Burroughs Corp.	B-80	B-80		20	35	11/76	50	15	65	NA
Business Controls Corporation	System 80	PDP-8/a		30	35	/71	80	0	80	30
	System 80	PDP-11/34		35	65	/75	10	0	10	15
Business Systems Products, Inc.	Adviser II			35	45	7/76	NA	NA	NA	100
	Adviser III			65	85	9/76	NA	NA	NA	300
Cascade Data, Inc.	Concept II	Concept		25	45	6/75	175	0	175	110
	80/20	Concept		28	35	1/70	)	)	)	X
	80/30	Concept		31	40	1/70	) 150	) 75	) 225	X
	80/40	Concept		46	57	1/70	)	)	)	X
Century Computer Corp.	C-400	C-200			45	3/75	125	25	150	120
	C-700	C-200			55	6/76	25	6	31	60
	Opus III	C-200			22	2/71	560	40	600	X

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AS OF JANUARY 1, 1977

NAME OF MANUFACTURER	COMPUTER MODEL	PROCESSOR MODEL	NOTES	PURCHASE PRICE ($1,000) BASIC	AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED	ESTIMATED PRODUCTION NEXT 12 MO.
Cincinnati Milacron	George-40	CIP/2200B		16	20	2/77	0	0	0	NA
	George-60	CIP/2200B		26	34	/76	)	)	)	NA
	George-70	CIP/2200B		26	39	/76	) 315	) 55	) 370	NA
	George-80	CIP/4400		43	58	12/76	)	)	)	NA
	Other	CIP/2200B		23	42	/74	)	)	)	X
Clary Data Systems	404	Clary		6	30	1/70	100	32	132	X
Complete Computer Systems	II-3	Nova-3/12		36		10/76	NA	NA	NA	NA
	III-3	Nova-3/12		48		10/76	NA	NA	NA	NA
	IV-3	Nova-3/12		64		10/76	NA	NA	NA	NA
Compucorp	402	Compucorp 3000		13	15	1/76	15	450	465	NA
	450	Compucorp 3000		20	22	4/76	40	100	140	NA
Compumatics	Whizkid 100	Compumatics		12		9/76	NA	NA	NA	NA
Computer Covenant	CPBS 1	PDP-11/04		24		6/76	NA	NA	NA	NA
	CPBS 2	PDP-11/34		42		9/76	NA	NA	NA	NA
	CPBS 3	PDP-11/70		100		12/76	NA	NA	NA	NA
Computer Hardware, Inc.	2120	CHI		15	50	5/75	10	1	11	12
	2130	CHI		33	75	11/74	130	2	132	20
	3230	CHI		77	90	/77	0	0	0	12
Computer Horizons, Corp.	CHC Distribution System	PDP-11/34,11/70		30		/77	0	0	0	NA
Computer Interactions Inc.	Compo II	PDP-8/e,f,or m		45	60	11/72	112	0	112	40
	Compo II-11	PDP-11		50	60	6/75	70	0	70	20
Decision Data Computer Corp.	System/4	System/4		23	37	8/76	15	0	15	500
Design Data	N312	Nova-3/12		31	75	8/75	100	10	110	200
	EC 300	Eclipse-C/300		60	150	3/76	40	10	50	100
Digital Computer Controls	1500	DCC-416	c	16		/76	15	0	15	NA
	2500	DCC-Mod 5	c	29		/76	25	0	25	NA
	3700	DCC-616	c	40		/76	10	0	10	NA
Digital Equipment Corp.	Datasystem 300	PDP-8, PDP-11		14	25	/72	) 2100	) 1100	) 3200	NA
	Datasystem 500	PDP-11		58	80	/72	)	)	)	NA
Digital Systems Corp.	Galaxy/5-130	Galaxy/5		33	50	1/76	4	0	4	8
	Galaxy/5-140	Galaxy/5		61	80	8/76	6	0	6	12
	Galaxy/5-150	Galaxy/5		120	130	12/76	2	0	2	14
	Galaxy/5-160	Galaxy/5		230		/77	0	0	0	2
	Galaxy/5-170	Galaxy/5		358		/77	0	0	0	2
Dimis, Inc.	Total 100	Modcomp II		135	150	7/74	5	0	5	7
Display Data Corp.	Insight	Microdata 1600/30		38	62	1/74	175	0	175	140
Educomp Corp.	E-100,200	PDP-8		7	9	/72	)	)	)	NA
	E-250,400	PDP-8		16	25	/72	)	)	)	NA
	E-450,500	PDP-8		32	43	/75	) 145	) 6	) 151	NA
	E-600,700,710	PDP-11		44	68	/75	)	)	)	NA
	E-800,910,940,960	PDP-11		102	150	/75	)	)	)	NA
Financial Computer Corp.	System III/10 (Fedder)	System III		38	45	1/75	250	25	275	200
GRI Computer Corp.	System 99	GRI 99/50		20	30	11/74	115	35	150	NA
General Automation, Inc.	DM-130/2	SPC-16/45		28	28	12/74	100	175	275	200
	DM-130	SPC-16/45		30	38	12/74	50	25	75	50
	DM-140	SPC-16/65		48	80	1/75	8	17	25	5
General Information Systems	GIS-350 ABLE	PDP-11/34		45		1/76	4	0	4	NA
General Robotics Corp.	GRC-11/03	PDP-11/03		14		7/76	10	0	10	NA
	TSS/11	PDP-11/34		60		12/75	7	0	7	NA
Hotel Computers, Inc.	unnamed	Varian V-72		125		5/73	10	0	10	NA
Information Associates, Inc.	TIS	Nova-830		47		9/74	5	0	5	NA
International Business Machines	System/32				38	3/75	8000	2500	10500	8000
International Computing Company	System 95/99	Nova-2/10		24		10/72	9	0	9	NA
IST Datasystems	TPS	Nova-3/12		25			NA	NA	NA	NA
	BPS	Eclipse-S/200,C/300		40		9/76	NA	NA	NA	NA
Jacquard Systems	J-100			15		8/75	NA	NA	NA	NA
Lockheed Electronics Co., Inc.	System III	Lockheed SUE		30	50	1/73	1080	157	1237	NA
Logical Machines Corp.	ADAM	ADAM		40	40	4/75	75	75	150	400
Martin Wolfe, Inc.	Mesa Two 7000	DCC 116		54		12/71	140	0	140	0
	Mesa Two 4000	DCC 116		62		2/76	3	0	3	0
Med Scientific International Corp.	unnamed	Nova-3		110			NA	NA	NA	NA
Microdata Corp.	Reality	1600		39	68	12/73	692	58	750	840
	Reality 11	1600		32	34	12/76	1	0	1	200
	Express Series	Express		39	50	11/76	5	0	5	100
Mini-Computer Systems, Inc.	MICOS 1003	Nova-3/12		50	55	/73	180	70	250	)
	MICOS 5003	Nova-3/12		72	80	8/75	35	15	50	) 400
	MICOS 7003	Nova-3/12		83	90	8/75	) 145	) 55	) 200	)
	MICOS 9003	Nova-3/D		99	110	8/75	)	)	)	)
Minuteman Computer Corp.	1774	Nova-2/4		35	40	11/71	30	0	30	NA
	1775	Nova-2/10		37	44	3/72	12	0	12	NA
	1776	Nova-2/10		40	59	3/72	20	0	20	NA
Modcomp Business Systems	204	Modcomp II		55		/76	NA	NA	NA	NA
	232	Modcomp II		96		/76	NA	NA	NA	NA
Mylee Digital Sciences Inc.	3056	Mylee 3G		38	45	5/76	17	0	17	36
	3088	Mylee 3G		41	52	5/76	21	0	21	36
NCR Corp.	8200	NCR		33	66	9/75	670	730	1400	NA
	8250	NCR		42	78	12/76	15	5	20	NA
Norfield Datasystems, Inc.	Nova-system	Nova		35		6/73	20	0	20	NA
	Eclipse-system	Eclipse C/300		75			NA	NA	NA	NA
Northrup Data Systems	BDS-700			39	50	3/77	0	0	0	NA
	BDS-1000	Microdata 1600		50	75	6/72	35	0	35	NA
	BDS-2000	Microdata 1600		63	100	10/73	40	0	40	NA
Pako Corp.	Pricing System	CAI LSI 2/20		32		6/75	NA	NA	NA	NA
	Pricing/Invoicing System	CAI LSI 2/20		70		6/75	NA	NA	NA	NA
Programmed Control Corp.	Prophet 21/1	TI 960 B		42		/72	15	0	15	NA
	Prophet 21/2	TI 990/10		42		1/77	0	0	0	NA
Qantel	800/900	Q7		28	29	5/75	93	71	164	98
	950	Q7		32	36	11/75	144	45	189	157
	960	Q7.5		48	56	11/76	15	5	20	15
	1200	Q7		42	59	11/75	213	23	236	1
	1300	Q7.5		42	59	11/75	44	18	62	28
	1400	Q7.5		44		5/77	0	0	0	47
Randal Data Systems	Link-100	Randal-100		13	23	10/75	121	0	121	200
	Link-200	Randal-200		24	35	10/76	70	0	70	200
	Link-300	Nova-2/10		34	45	6/74	) 27	) 0	) 27	0
	Link-400	Nova-2/10		36	45	6/74	)	)	)	0
STC Systems	ULTIMACC-2000	Nova-1200		41	57	9/72	80	2	82	10
	ULTIMACC-3000	Nova-830		47	77	1/75	60	2	62	20
	ULTIMACC-3370	Nova-830		86	125	11/75	5	0	5	10
Tal-Star, Inc.	TDMS System	GA 18/30		74		/72	NA	NA	NA	NA
Tri-Star, Inc.	TTK-10	Nova-3/12		45	55	2/76	12	0	12	30
	TEK-80	Nova-3/12		52	67	4/76	4	0	4	10
Vanguard Computer Systems, Inc.	V500	Raytheon RDS 500		65	85	3/76	3	2	5	20
	V600	Raytheon RDS 500		45	45	/77	0	0	0	10
Wang Laboratories, Inc.	WCS-20	Wang 2200		10	15	/73	3350	1650	5000	NA
	WCS-30	Wang 2200		20	30	/73	2550	1250	3800	NA
Warrex Computer, Corp.	Centurion I-A	CC-201		18	19	/77	0	0	0	70
	Centurion II	CC-202		27	30	/75	25	0	25	0
	Centurion III	CC-203		36	36	/74	170	0	170	89
	Centurion IV	CC-204		43	43	/75	15	0	15	5
	Centurion VI	CC-206				/77	0	0	0	NA
TOTAL							25188	10552	35740	

Notes:

a. Includes installations of Eldorado-140.
b. Basic/Four Corporation computer models used Microdata processors until November, 1976.
c. DCC became a subsidiary of Data General Corporation in early 1977.

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COMPUTER SERVICES GROW STEADILY TOWARD 1981 REVENUES OF $11 BILLION AS REMOTE OFFERINGS START TO OVERTAKE TRADITIONAL BATCH PROCESSING

Computer services -- software, facilities management, and outside data processing -- did well in 1976 as they zeroed in on the $5 billion revenue mark with a 17% growth rate. With over 2,000 outfits currently offering "computer services," the industry is highly-fragmented . . . but beginning to consolidate around a base of six companies. Control Data, Computer Sciences, Automatic Data Processing, Electronic Data Systems, System Development Corp., and GE/ISBD each rang up over $100 million in sales in 1976 and together accounted for a fourth of the market.

In the face of strong competition -- from minis, micros, small business computers, and data processing networks -- services vendors flexed their muscles last year with a new array of software packages (27% growth), and remote autotransaction services (35% growth). With a projected growth rate of 16%-20% per annum over the next five years (to $11 billion by 1981), the services industry continues to burrow into its niche of offering industry/application expertise to EDP users. The future appears particularly bright for suppliers who:

+ Diversify and improve software products
+ Expand remote DP and data transmission services
+ Cater to the first-time user market
+ Incorporate minis/intelligent terminals into offerings
+ Challenge in-house DP departments with better backup, support, documentation, and responsiveness

Non-processing services

Most computer users have their own staff, but new systems programs -- DBMS, telecommunications, etc. -- can be costly and slow to develop, and many users are turning to software packages. Although contract development software still holds about 60% of outside software spending, packaged software is expected to outpace it within a few years. (To date, 227 software packages have passed the $1 million mark in sales; Cincom's TOTAL alone has topped $50 million.) By 1981, outside software should beget $2 billion in revenues -- about half going for packages.

Some attractive future markets include: "hardwiring" software for microprocessors, developing turnkey systems for first-time users, and creating new software packages and telecommunications monitors for DP networks.

For those who don't want the hassle (management control, hidden costs, etc.) there is always facilities management . . . which grew 16% last year to revenues of $495 million. Of software services, facilities management, and processing services, FM will show the slowest growth rate through 1981, with industry-specific FM services countering a downward trend in commercial custom services.

Processing services . . .

. . . once again dominated services in 1976 with over 70% of revenues ($3.6 billion). Although this ratio will remain steady through 1981, change will occur within the processing market itself. Batch processing led in 1976 revenues with a 52% share ($1.8 billion), but remote problem-solving and autotransaction were catching up. This year the combined revenues of these remote services will pass batch for the first time. By 1981, remote autotransaction -- on a 35%/year growth rate -- will command the market with a 42% share, batch will shrink to 30%.

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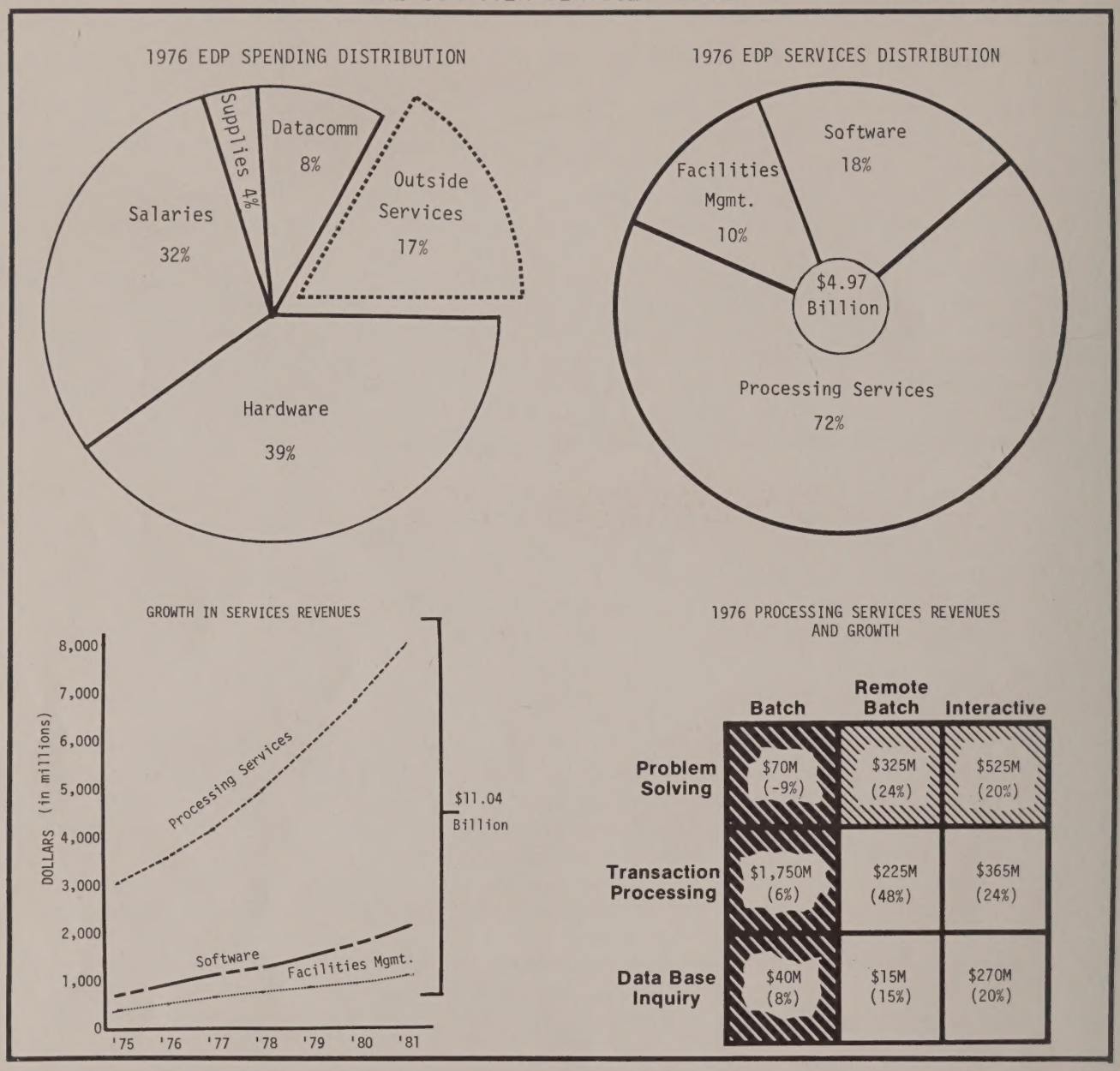
THE COMPUTER SERVICES MARKET



The future for processing services looks bright . . . as service bureaus continue to offer the customer "handholding" that so strains the support resources of hardware manufacturers and continue to make it their business to know a customer's business as well as him. Meanwhile, companies get acquired, product uniqueness provides entrepreneurial opportunity, and good service begets more business from customers no longer enamored of the computer.

The big question is IBM. In 1979 the company will no longer be barred from offering computer services -- an outgrowth of the CDC antitrust suit settlement -- and the Giant's domsat subsidiary, Satellite Business Systems (SBS), will be gearing up to offer its unique data transmission service. IBM's not likely to ignore the networking capabilities made possible by SBS . . . nor a potential $8 billion 1981 market for processing services. The form and thrust of IBM's next "service bureau" should be interesting indeed.

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DISTRIBUTED PROCESSING . . . HARD TO PIN DOWN, HARDER TO IGNORE

If there's to be an offspring of the collision between the computer and communications industries, "distributed processing" may well be it. With processing power getting cheaper all the time -- faster than communications costs are falling -- the incentive for users to decentralize a portion of their DP operations grows stronger all the time. The fact that vendors on all sides -- minicomputers, intelligent terminals, mainframes, data entry, and even computer services -- are touting DDP's virtues adds to the allure.

It also adds to the confusion. In study after study, while IDC finds that interest in "distributed processing" is intense . . . it also finds there is no clear consensus as to what the phenomenon actually is. IDC's working definition, however -- which distinguishes between "distributed" and "decentralized" processing -- recognizes some common elements running through most DDP systems. A true-blue DDP setup would include:

- A network of processing nodes functionally or geographically distributed that are connected via some communications link . . . not necessarily an electronic one.

- The storage and manipulation of data at each node . . . meaning decentralized/distributed data bases accessible to other nodes.

- Some sort of central control -- software development, hardware acquisition, etc. -- so the pieces of the net fit together as a system, not just a collection of interconnected, independent nodes.

If definitions aren't clear, at least the pros and cons of DDP are. Where the 80-20 rule applies (80% of the DP done for a site is important only to that site, 20% gets passed on), users are finding that downstream processors with local storage are cheaper than data communications. In addition, the idea of giving local managers' responsibility -- and accountability -- for their own DP has its appeal. On the downside, distributed processing means moving the electronic equipment and programs away from the pool of expertise best qualified to deal with bugs, breakdowns, and changes. (Mini-based or not, the equipment is still complex, trouble-shooting and debugging still a technical chore). Network management is another possible DDP migraine.

Also, until the advent of the Series/1, DDP meant for the most part using non-IBM gear. For many companies, that was an unpopular choice.

So, most DDP systems involve long lead times for development, phased implementations, frequent cost justification, and a certain amount of pioneering . . . and revenues directly attributable to DDP are not yet gushing in to vendor coffers. Still, if the success of companies like Burroughs, Datapoint, Sycor, Four-Phase, and Raytheon -- whose intelligent terminals have done so much to boost DDP -- is any indication, DDP is here to stay. Ask companies like Entrex, Inforex, Data 100, CMC, Mohawk, Honeywell, NCR, and even IBM . . . all of whom are clamoring at the gates.

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For readers interested in following DDP and data communications, IDC now offers the low-cost Distributed Processing Reporting Service, featuring a monthly newsletter, special reports, and news memo. . . providing a quantitative picture of DDP and datacomm. For more info, contact IDC or the editors of EDP/IR.

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• NEW TECHNOLOGIES ARE BEGINNING TO TURN UP IN THE MARKET: Texas Instruments, for instance, has opted to put its magnetic bubble memory (EDP/IR,March 11, 1977) to use in two new models of its "Silent 700" terminals. Each terminal will come with 20,000 bytes -- expandable to 80,000 -- of the non-volatile memory. TI says this is the first known commercial use of bubble memories. Still another type of memory technology -- that of charge-coupled devices -- was used by Burroughs in its "Burroughs Scientific Processor," announced this month (see page 5). The CCD memory is used to store programs and data used by both the system's control processor and vector processor and has a storage capacity of 4 million words, expandable to 67 million words.

Technology buffs are also studying a thing called the "Wiegand Effect" these days. The technology, according to the company that bought the patents from inventor John Wiegand, is a new pulse generating method requiring only a permanent magnet, a pick-up coil, and a specially-treated "Wiegand wire." Because of the wire's magnetic properties, subjecting it to a small external magnetic field induces a relatively powerful (one to three volts) pulse without an external power source. Applications are foreseen in automobile ignitions, industrial controls, and electronics . . . and one of the first licenses to study and use the technology went to none other than IBM.

• PACKET-SWITCHING IS GETTING COSMOPOLITAN: Telenet and ITT WorldCom have entered into an interconnection agreement for the provision of packet-switched data communications between the U.S. and overseas points (Telenet will also be interconnecting with overseas packet-switching facilities operated by RCA GlobCom). ITT WorldCom calls its side of the service its "Universal Data Transfer Service" and will offer packet-switching to countries overseas and interconnection to other U.S. packet nets, such as Tymnet, in addition to Telenet.

• MINILAND IS REPLETE WITH NEW PRODUCTS: Data General ended the first quarter of 1977 by announcing the newest member of its Eclipse family, the S/130, for users too big for a Nova 3 and too small for a regular Eclipse. DEC announced two new "Distributed Plant Management" systems, the DPM 60 and DPM 80, based on its PDP-11/34 and 11/70 minis. Linking I/O devices with the host CPUs will be a specially-designed 56KHz cable called the DECdataway with its own controller acting as a front end to the CPU. Varian has added a family of high-speed disks to its recently-announced V77 minis, providing capacities up to 4.8 billion words (unformatted) on the minicomputers that Varian says "think like mainframes." Last but certainly not least, Systems Engineering Labs has a new top of the line in its recently-announced SEL 32/75 computer. Says the company, "The SEL 32/75 offers the power and architectural features associated with large-scale computers like the DEC 10 and 20 Series -- but at minicomputer prices." The average system, according to SEL, will probably sell for under $125,000.

• FIRST SERIES/1 USERS TO IBM'S GSD: The machine looks good in the development stage and thanks for recently adding a numeric pad to the terminal keyboard. We could use a printer that doesn't eat up so much paper.

• FROM OUR INDUSTRIOUS NEIGHBORS TO THE WEST: Fujitsu is said to be readying an enhanced version of its M-190 (tentatively designated the M-190H) reported to be a four-unit multiprocessor with a price/performance 40% higher than IBM's 3033. The M-190H, according to EDP/IR sources, will be "entirely different" from the Amdahl uniprocessors -- which Fujitsu is helping to manufacture. And closer to home, Nippon Electric has formed a new U.S. computer company.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" MAY 11, 1977 • VOL.12,NO.21 P.J.McGOVERN,PUBLISHER

NCR FILLS IN SERIES 8000 (CRITERION) PRODUCT LADDER; MICROCODE ALLOWS CENTURY EMULATION, INTERACTIVE AND VIRTUAL PROCESSING

When NCR introduced the first of its "Criterion" computers -- the 8550 and 8570 -- it was with the promise of more to come. Last month that promise was fulfilled and renewed when the company dramatically expanded its product line with three new computers -- configured into five models -- and promised more in the fall. The NCR announcement -- heavily preannounced (EDP/IR,April 22,1977) -- was more than simply an introduction of new computers, however. It was also:

- A show of strength in the face of stiffer competition from IBM and others, and a reaffirmation of NCR's serious mainframe intent.
- An opportunity for the company to emphasize its "migration path engineering" design concept and product modularity.
- A sneak preview of the full "Series 8000" line, and of the soon-to-be announced network architecture and IBM-compatible datacomm discipline.

NCR admitted that it had adjusted its mainframe prices downward as a result of the industry-wide price cuts inspired by IBM . . . but stressed that it was nothing to get excited about. Memory prices were cut 25%-30%, earlier Criterion CPUs lowered about 5%, and the new systems offered at 10% less than the pre-price cut list. (Reductions are still being worked out for the Century line.)

The marketing theme for NCR's Series 8000 products will be upward -- and lateral -- compatibility, even for Century users. According to one NCR spokesman, "most users will be able to just wheel in a new processor without changing peripherals or programs." The object, of course, is to cut conversion costs for users migrating upward from NCR's growing base of small business computers . . . and to hang onto the existing Century customer base.

But such commitment to the mainframe business hasn't come without its attendant trauma . . . four years of dramatic product and development change, corporate reorganization, and strained profit margins preceded it as NCR abandoned its mechanical and electromechanical equipment business for electronics. Now, according to Chairman W.S. Anderson, the major blocks are in place, and NCR is optimistic about its new direction. "I think it is worth noting," he adds, "that our mainframe computer business is now the most profitable part of our equipment business." NCR is ready to pursue that profitability.

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A VENDOR COMMENTS ON THE NEW EDP PRICES

The recent EDP price cuts have affected users and investors as well as vendors. To users they're a (perhaps overdue) boon, but to investors they're cause for concern over future profit margins . . . a concern reflected in recent stock price fluctuations. C.E. Exley, NCR's new president, addresses the issue:

"In the past two weeks, certain pricing actions were taken by our largest competitor. The releases which we are making today take into account these actions which have caused considerable concern, not to say alarm, among some observers of the industry. I suspect that the concern is greater on the part of observers than of the participants of the industry.

"Price reductions in DP equipment should not be surprising because they are nothing new. We estimate that the price of executing a COBOL instruction has declined to less than 1/100th of what it was a decade ago. Meanwhile, the price of storing a byte of information in memory has declined to 1/4 the former level, and in auxiliary memory to 1/3rd. The cost of mechanically printing a thousand lines of information has declined to 1/4th the cost of ten years ago.

"Reductions of this magnitude have, from time to time, led some industry observers to expect a leveling, or even a shrinkage of industry revenues. Yet this has not happened, and there are basically three reasons:

"-- The underlying growth in requirements for information is continuing.

"-- Industry revenues have continued to grow because better price/performance values have encouraged users to computerize more of their applications, thus expanding the market for both hardware and software.

"-- Today's increasingly cost-effective hardware and software provides valuable user benefits which have consumed a large part of the available performance characteristics . . . [such as the move from] programming applications in native machine language, to assembly language, to high-level languages. Each of these steps has somewhat reduced CPU efficiency in exchange for greatly increasing the efficiency of the people who work with the equipment."

In short, memory costs will continue to fall, and it's reasonable to expect the cuts to wend their way into manufacturer's prices . . . even IBM's.

The new hardware

With the introduction of its new machines, NCR has completed about half of its eventual Series 8000 lineup, and this fall's announcement should substantially increase that percentage. Within each product family (represented by the second digit in the model number) will be several models (represented by the third digit). In addition, models will be offered in one of three modes:

- "I" mode -- for systems optimized for interactive processing.
- "N" mode -- for systems emulating NCR Century operations.
- "V" mode -- for systems with at least 384KB of main storage operating on NCR's "Virtual Resources Executive" (VRX) virtual storage software.

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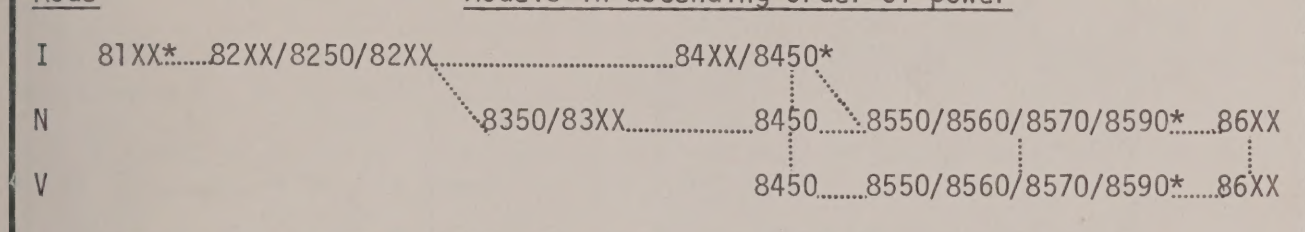
THE NCR SERIES 8000 PRODUCT LADDER

NCR's Series 8000 machines are optimized for different uses. For models of 8450 size or greater, that optimization is implemented via microcode read into main storage from floppy disk. Users may switch modes as often as they wish, says NCR . . . several times a day is not inconceivable. For the smaller 8000 Series computers, the different modes of operation are offered with different CPUs. In the three modes, NCR's Series 8000 looks like this:



* To be announced in 1977 (XX models are planned but unannounced).

For upgrading users, the various modes offer handy migration paths . . . Century users can still run their old applications on the new models without conversion of software but write new applications to take advantage of virtual storage. (Under VRX, which requires a minimum memory of 384KB, Series 8000 systems act as virtual machines -- executing high level programs with 70% fewer memory accesses.)

Model by model the new systems are the:

- N-8350 -- a 16-bit processor with 38KB to 128KB of memory, cassette reader and 9.8MB of disk. Its compeitors, says NCR, will be the IBM System/3, Burroughs 1712, and Univac 90/25 and 90/30.

- N-8450 and V-8450 -- a 32-bit processor with 128KB to 1MB of memory, up to 200MB of disk storage, and various peripherals. The 8450s will compete with IBM System/3-15s, 370/115-2s, and 125-2s, Burroughs B1700s and 1800s, and bigger Univac 90/30s.

- N-8560 and V-8560 -- a 192KB to 1.5MB processor with faster cycle time than the 8450, and support for 200MB of disk and various peripherals. 8560s should compete with IBM 370/125-2s and 138s, Burroughs B 2800s and 3800s, and Univac 90/30s and 90/60s.

Prices for the systems range from $2,210 per month rental for the 8350 up to $6,330 for the V-8560. NCR also points out that the N-8450 has the same throughput rate as the older N-8550 . . . and thus repesents a de facto price cut for the bigger model. The V-8450, however, offers about 60% of the power of a V-8550.

A look at the books

NCR's transformation from "The Cash" to a modern electronics manufacturer is virtually complete -- terminals, data entry, and computer systems accounted for about 87% of last year's $1.3 billion in equipment revenues (see chart, page 4) -- but the transition years were among the roughest in the firm's 93-year history, with a $60 million loss in 1972. Self-fulfilling prophesies aside, the decision to abandon mechanical and electromechanical cash registers and adding machines was a timely one: Since 1972 total revenues for these devices have fallen to al-

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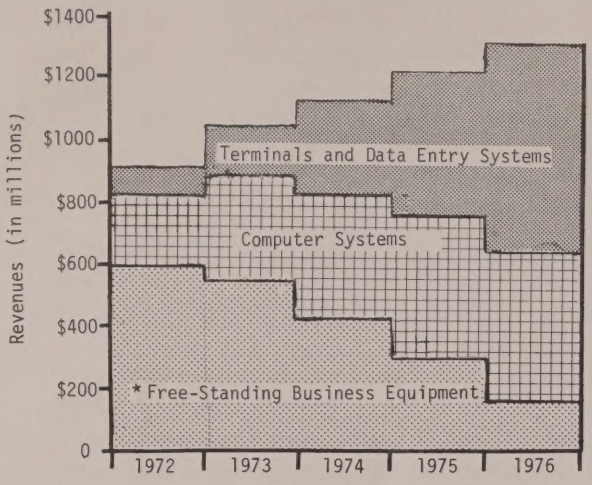
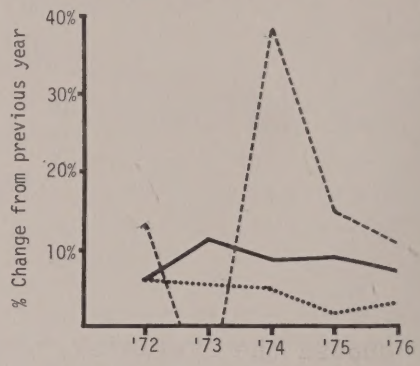
NCR'S PRODUCT AND DEVELOPMENT MIX

Changing Product Revenues



*includes mechanical and electromechanical CRs, accounting machines, & calculators

Percent Change For Selected Items



LEGEND:

-------Research and Development
———Revenues
·····Selling, General, & Admin. Costs

most a quarter of their previous level of $600,000. In contrast, NCR's POS terminal and ECR market grew 44% last year.

Also, last year -- only three years after NCR's profit margin hit a post-depression low of -3.9% -- new records were set for revenues and earnings. Earnings rose 32% to $95 million on revenues of $2.3 billion, up 7% . . . gains made more striking by a 1975 dip in earnings of 18% from the previous year. Research and Development climbed 11% to $94.3 million in 1976, and accumulated debt pared by $70 million. And this year NCR bucked its traditionally slow first quarter start by registering a 26% profit gain over the year before . . . attributed by the company to a more favorable business climate and reduced product costs stemming from the switch to electronics. This year, says NCR, the firm will announce some 69 new products -- double last year's -- including the new computers.

Though prospects have improved considerably for the Buckeye manufacturer, it has some territory to regain . . . the prolonged transition years hurt its market share as other manufacturers moved in with innovations and capitalized on startup problems with the Century line. NCR currently has about 6% of the domestic general-purpose computer market by number, 3% by value. And except for last year's unusually large profit increase (due to the 1975 drop), NCR has consistently fallen short of the other mainframers' growth average . . . 20% a year on earnings, 12% a year on revenues. Users of the Criterion models introduced last year have proceeded with caution -- nearly 80% of them have rented their systems.

By broadening the Series 8000, NCR increases the probabilities of having its terminals plugged into its own machines . . . and demonstrates its mastery of electronics and commitment to mainframes. The ability to market complete, integrated systems across a broad product range gives NCR a "value-added" competitive edge . . . with new products providing a clear avenue for growth.

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IBM'S GENERAL SYSTEMS DIVISION ADDS TO ITS SERIES/1, SYSTEM 3X LINE AS DIVISION REVENUES HEAD TOWARD $5 BILLION BY 1981

IBM's General Systems Division moved to a new location in Atlanta last month, and its new abode -- 375,000 square feet, energy-efficient, ecology-conscious, and surrounded by blooming dogwoods -- speaks of the growth and character that have been part of the division's heritage since its formation in 1969. With revenues passing $2 billion this year, according to IDC forecasts, the small systems wing of the world's largest computer maker is almost a company in its own right.

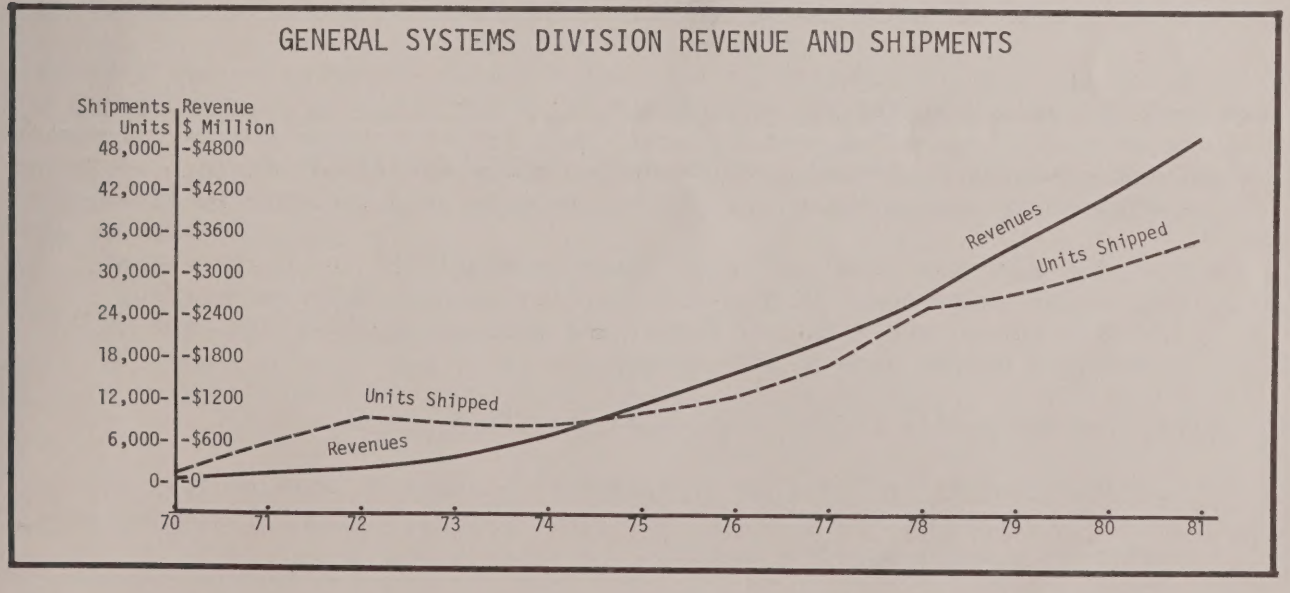
And, as small computer companies are wont to do, GSD last month added to its product line . . . and in the process may have foreshadowed later IBM products and developments. In two major announcements, GSD:

- Added higher-level software to the Series/1. New hardware was also announced with lower memory prices (EDP/IR,April 22,1977).
- Introduced a System/32 upgrade -- and possible System/3 successor -- dubbed the System/34, which emphasizes interactive use and comes with some interesting new hardware.

In addition, GSD joined IBM's Data Processing Division in its price cutting spree (EDP/IR,April 22,1977) . . . continued to add IAPs to its System/32 applications arsenal with an accounting program for small banks . . . and sounded taps for one of its oldest, most successful products, the IBM 1130.

Enhancement of the S/1

The Series/1's first major upgrade came primarily in software. GSD introduced a realtime disk-based programming system of supervisor services, data management, communications, and utilities software designed to provide multiprogramming and multitasking; a program preparation subsystem -- job stream processor, text editor, macro assembler, and applications builder -- that runs on the programming system; PL/1 and Fortran support and a "Mathematical and Functional Subroutine Library"; and enhancements to the Control Program Support announced with the S/1 introduction. Hardware included new 32KB memory cards and processor models incorporating them, an impact line printer, and a keyboard display station.



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THE SUNNY SIDE OF ENERGY WOES

When IBM announced the Series/1 last fall, GSD spokesmen stressed its "sophisticated end user" orientation, and observers inferred that if any software were to follow the sparse fare served up initially, it would be of the systems variety that users could use as tools in developing their own applications.

Then, surprise, the first software announced for the S/1 after its introduction was a turnkey set of programs called Facility Control/Power Management 1, 2, and 3 for power management in facilities spending over $5,000 a month on energy bills. (Monthly lease prices: $130 to $240, waived after 48 months.)

An uncharted change of course? No, says GSD. It's just that it was such a cold winter, there's a new energy-consciousness across the land, and the System/7 had been pulling so well with its power management application that the application was too good to pass up. (IBM itself has become quite enery-conscious in its facilities -- such as in GSD's new conservasionist building, where heating is supplied primarily from the lighting and GSD's computers.)

No, the main thrust of the S/1 is still the "sophisticated end user" who is willing to develop his own applications software, but, yes, there may be isolated examples of other such S/1 applications programs offered . . .

With the added peripheral and software support, it appears that IBM is planning to market the Series/1 offensively -- as opposed simply to making it available for interested users -- and IDC forecasters see shipments of the mini reaching 20,000 units a year by 1981 (EDP/IR,April 22,1977).

The System/34

Billed as a multiple workstation system, the S/34 adds the interactive capabilities the S/32 lacked . . . and appears likely to eclipse some low-end S/3 sales. The components comprising the system include: The IBM 5340 System Unit, which contains the CPU, magnetic media, and workstation controller; the IBM 5251 Display Station, which can operate point-to-point or multipoint-to-point with the workstation controller; the IBM 5256 Workstation Printer; and an optional IBM 5211 line printer. Software includes RPG II, a workstation utility, an S/34-only IAP for distributors . . . and a deceptively powerful System Support Program.

Some of the more interesting features of the S/34 -- not necessarily emphasized in IBM's press literature -- include:

- Dynamic storage allocation -- otherwise known as virtual storage -- making concurrent diagnostics and built-in failure recovery possible.
- What IBM salesmen term an "intelligent terminal" in the workstation/controller subsystem. With a CRT transfer rate of 1MB/sec dwarfing IBM 3270 rates, and with new format and display capabilities, the 5251 could well evolve into a 3270 successor.
- Support for double-sided, double-density floppy disks.
- Use of a distributed systems architecture -- with a "main storage processor" doing most CPU tasks, other processors handling certain system supervisory tasks and I/O control.

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- Integrated 1200 or 2400 bps modems available with the communications feature; also an optional switched network backup available with manual dial and auto answer or manual answer.

- Auditability through the use of a transaction file, memo posting to a master file, and the built-in recovery techniques . . . as well as the ability to operate in a degraded condition.

The S/34 can support from 32KB to 64KB of main storage, a diskette unit, 8.6 to 27.1 megabytes of nonremovable disk, up to 8 workstations (CRT or printer, one as console), and a line printer. Conspicuous by its absence is the capability to connect workstations remotely via telecommunications lines. And perhaps because of different system architecture, S/32 software is not strictly compatible with S/34 operations . . . recompiling and some modification may be necessary. Rental starts about $1,260 for a typical small system, runs twice that on a bigger one.

What exactly is the System/34? To EDP/IR it has all the earmarkings of being a bridge machine -- new architecture, parallel microprocessors, optimization for transaction processing -- for S/32 users and some S/3 users. It's aimed at first time users with interactive needs . . . but also shows promise for future use in distributed processing applications. Last but not least, it could be the next rung in a GSD product ladder leading to the 370 line . . . and bypassing the current System/3. Future enhancements will tell a story.

GSD versus DPD

One wonders (and perhaps so do IBM insiders) exactly how IBM will integrate the top of GSD's product line and the bottom of DPD's. With little imagination, for instance, it's easy to see the controller/workstation subsystem of the S/34 at work as a separate data entry/intelligent terminal node in a DDP network . . . so far DPD's province with the 3790/3740. And large System/3s are already as powerful as the smaller 370/115 configurations.

While DPD is moving up the product line with the 3033, it seems that GSD is positioning itself to chomp into the opposite end of DPD's line. When EDP/IR asked one GSDer why a user should get a 370/115 instead of a GSD product, the answer was an enigmatic, "Hm, yeah. I don't know. Why would he?"

TIPS FOR THE FIRST TIME USER

At a recent sales presentation on the S/34, the IBM salesman presiding concluded with five tips for first time users of the new system. They're common sensicle, perhaps, but the implied caveats illustrate the confusion that can ensue when a small business takes the plunge into the mysterious water of EDP. The salesman's points:

1. Keep it simple
2. Use a phased approach
3. Start with a single workstation
4. Start with and justify with your major applications
5. Pay only for what you need

One tip for second time users (from the same salesman): Don't turn in your System/3 on rent. Exercise your purchase option credits, buy it, and take advantage of its currently high residual value. Interesting pitch.

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• TI ROLLS OUT A FLOPPY-DISK-BASED MICROPROCESSOR DEVELOPMENT SYSTEM that provides comprehensive hardware and software design support for TMS 9900 Series users. The new system features a TMS 9900 Emulator/AMPL package, PROM/ROM implementation, logic state trace, and FS990 Software Development System. The basic system costs about $13,600, with first deliveries scheduled to begin in July.

• TELENET'S VOLUME DISCOUNT DRAINS THE COST OF COMMUNICATIONS for datacomm packet network users. Under the new rate structure, customers will receive a graduated discount (ranging from 20%-50%) on monthly bills exceeding $5,000. The message carrier has also flattened its three-tier rate structure for public dial-in service, increasing charges in "high-density" cities, and reducing them in "low density" cities. Atlanta will now serve as a major network switching center.

• CALCOMP STILL LOOKING TO PULL LOOSE THREADS IN IBM SUIT, and, according to a company spokesman: "Any impressions that we are less than serious, are totally erroneous. We remain firm in the conviction that the lower court's dismissal ruling was in error, and that higher courts will reverse it."

But business goes on . . . and Calcomp recently installed the world's largest mass data storage and retrieval system for a U.S. Army DP center in St. Louis. The Model 7110 Automated Tape Library (ATL) has 1.5 trillion bytes of storage capacity -- to amass the equivalent information would require four million, 300 page books.

• A CONTROL DATA COMPUTER SYSTEM WILL DIRECT THE POWER for Hydro-Quebec's energy production and transmission network. A sophisticated dispatching center will monitor, and allow instant control over operations throughout the provincial network. The energy control system will be installed in 1979 at H-Q's Complex Desjardins in Montreal, and will include two CYBER 173s, four System 17s, and display screens.

• UNIVAC CUTS AND SHUFFLES ITS DECK on prices and configurations for selected Series 90 and 1100 computer systems. The reductions primarily reflect a drop in memory prices. For example, on a 90/60 processor configuration with 1MB main storage users will save 30% on memory expansion over 524KB, and on typical 90/60 systems, there will be a 3%-7% reduction. In addition, there are four new 1100/10 configuration packages with price adjustments ranging from 4% to 7%.

• INTEL KEEPS UP THE PACE WITH "PROMPT 48" MICROCOMPUTER PROGRAMMER, a low-cost, self-contained design aid for use with the single-chip MCS-48 microcomputer family. The PROMPT 48 allows a user to enter, execute, and debug programs with calculator-like ease. It can be used as a standalone programming tool, or integrated with other development aids. With two MCS-48 MPUs, it costs $1,750.

Intel also introduced the Intellec 888 System, which offers the most powerful microcomputer development center to date. With twice the on-line storage capacity of previous systems, it can support modular programming in both assembly and high-level PL/M language. The basic Intellec 888 system contains all software and hardware resources for the 8085 and 8080 micro systems, and for the SBC 80 family of OEMs. Intel also announced the in-7138 and in-7148 IBM-comaptible SC memories.

• BURROUGHS ANALYSIS AND DISTRIBUTION MACHINE OFFERS LOW-COST SOLUTIONS for common business applications. The C6413 is a powerful, pre-programmed desktop system that can distribute raw media into ninety categories. It can be used to determine sales by product, by sales representative, or by dept., and costs $1,495.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" MAY 31, 1977 • VOL.12,NO.22 P.J.McGOVERN,PUBLISHER

COMPUTER AUTOMATION AND DATA GENERAL DEBUT THEIR SPRING MINIS HONING OEM TOOLS WITH SOFTWARE AND PRICE

If the minicomputer industry's *forte* is bringing new technology to market in a hurry, its strength is the firehose stream of new products that keeps the industry's growth booming at over 30% annual rates (EDP/IR,April 22,1977). And this month two of the better-known names in the business -- Data General and Computer Automation -- added some new products to that stream.

The Data General product, the CS/40, is a NOVA-based family of small COBOL-driven machines for systems houses and end users in large, computer-savvy organizations. Prices for the transaction-oriented CS/40s run from $30,000 to $90,000. The Computer Automation offering is the Naked Mini-4 family, consisting at the moment of three models spanning the company's current line. Says the company, the new systems "shatter previously existing price/performance." Unit prices for packaged systems start under $1,000.

But new products introductions are routine in this business (Data General points out in one PR brochure that it introduced a new product "every 15 working days in 1976") . . . what makes the CS/40 and the Naked Mini-4 announcements interesting are the industry-wide overtones that come with them:

- Data General's CS/40 takes the company one step further toward that meaty end-user market . . . and does so less than a month after the company announced "Business BASIC" for NOVA and Eclipse users. Data General, with about three-quarters of its minis being shipped to the OEM sector, has been moving in this direction since the introduction of the Eclipse series. *The proffering of software and support suitable for end users is a major avenue of escape for minimakers vulnerable to the microprocessor invasion.*

- Computer Automation -- which brought the first sub-$1000 computers and the word "naked" to market -- has once again used manufacturing regimen to make its mark, not an R&D-spawned technological edge. "It's really a pricing story," says the company . . . system design started with a pricing target. *All too often, marketing and pricing are afterthoughts in high-technology businesses.*

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So, one manufacturer refines its OEM stance, another shifts it. In both cases the moves are indicative of the way the industry as a whole will have to behave if it is to compete with the likes of IBM on the end-user side, Intel, Texas Instruments, and someday perhaps Motorola on the semiconductor side. It's a way of fending off the outsiders.

Halfway to the end user

Data General's three-model CS/40 family is designed to complement the larger Eclipse family (which spans an $80,000-$200,000 price range) and provides systems houses and sophisticated end users with the tools necessary to put together a business computer. The systems use an ANSI 74-compatible COBOL, which is suited to transaction-driven applications, and an interface to the INFOS data management language available on the larger Eclipse computers. (Such an interface -- and the communications features available on the CS/40 -- make the set up of distributed processing nets feasible.)

The CS/40 CPU is a 64KB NOVA-3 -- expandable to 192KB -- and peripheral devices include CRT units, cartridge and floppy disks, mag tape, and a choice of printers. All of the systems come with the interactive COBOL and a bevy of software aids and utilities, and the CS/40 COBOL Screen Management Facility allows for the creation of interactive displays such as program "menus" and "fill-in-the-blanks" formatting. Up to nine data entry/display stations can run off a CS/40.

The three models in the new family:

+ Model 1 -- which can support one CRT, a 10MB cartridge disk, a 64KB CPU, and a 60 cps printer. A typical configuration would cost $33K.

+ Model 3 -- which can support up to four CRTs and floppy disk storage. A representative system with three CRTs would cost $40K.

+ Model 5 -- which can support up to nine CRTs. With 5 CRTs, a 300 lpm printer, and mag tape, a representative system would cost about $80K.

For users who want to connect their CS/40s to other computers or terminals, Data General provides synchronous communications to other CS/40 systems, larger Data General hosts, or IBM-compatible host installations. Batch communications are controlled via the company's RJE-80 facility using 3780/2780 protocols.

Making the most of making minis

Computer Automation's Naked Mini-4 is also a three-model family, starting with the LSI 4/10, a 16-bit minicomputer-on-a-board priced at $645 for single units. (The board includes 4K of random access memory and 4 I/O channels.) More than touting its technology, however, Computer Automation expects that its tight manufacturing controls and price-sensitive designing of the product — with the end result of better price/performance -- will be the driving forces behind its success. In addition, the systems were designed to be compatible with one another and with the company's current line . . . instruction sets are sub- or supersets of one another, offering what the firm calls "plug-in commonality."

The strength of the systems *per se*, say spokesmen, lies in its instruction set and distributed architecture. And the firm's reputation for producing especially reliable, durable minis should carry through to the Naked Mini-4.

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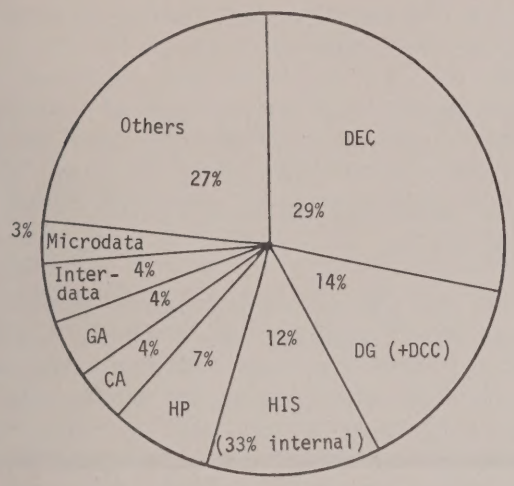
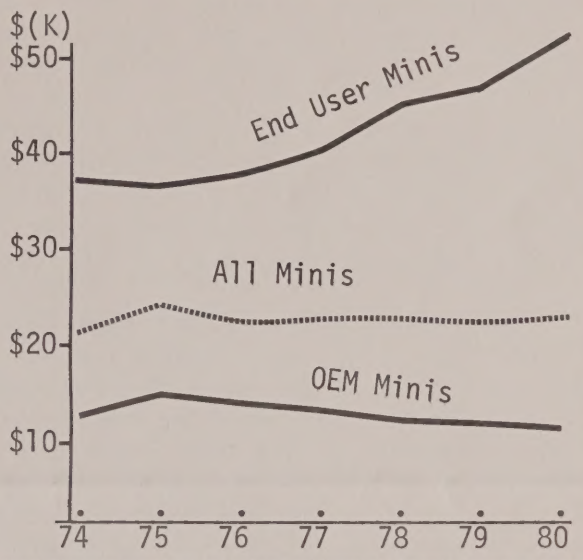
OEM MARKET SHARES AND AVERAGE SYSTEM VALUES

Market Shares



1976 Revenues -- $745 M

Average System Value



In the early days of minicomputers (1960s) the end user market was dominant -- most minis were sold directly to their ultimate owners. OEMs used specially-designed components, not relatively general-purpose computing devices. Today however, most units emanating from minimaker shipping docks go to OEMs, and these volume shipments help bring down per unit manufacturing and development costs. But end-user units -- thanks to value added in peripherals, software, and other trappings -- account for the major portion of minimaker revenues. With IBM's Series/1 leading the way into the end-user market -- and microprocessors pushing from the OEM side -- the industry may yet come full circle. Or at least three-quarters circle.

The three Naked Mini-4s:

+ The LSI 4/10 -- which comes with the 4K RAM and 4 I/O units on one board and is faster and cheaper than CA's Naked Mille. A packaged unit with chassis, console, and power supply costs $995.

+ The LSI 4/30 -- which offers 50% more performance at 25% less cost than its LSI-2/3 predecesssors. The 4/30 comes with 16K 16-bit words of memory and costs $3,495 with chassis, power supply, and console.

+ The LSI 4/90 -- which is twice as fast as the 4/30 and 60% of the cost of the company's "Megabyter." The 4/90 comes with 64K 16-bit words of RAM and sells for just under $1,000.

In addition, Computer Automation offers completely unbundled software and operating system modules for the Naked Mini-4 family, an OEM video display terminal, and an assortment of core and semiconductor memories. With its Naked Mini Division supplying over $22 million of last year's $30 million in revenue, the company expects the new models to augment rather than supplant current Naked Mini sales. This is feasible because of the nature of OEM product development . . . current OEM products will continue to use the older Naked Minis about which they

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ANOTHER WAY TO BEAT PRICES . . . .

. . . is with Hewlett-Packard's semi-new HP 3000 Series 1, announced late last month. "The HP 3000 Series 1 combines field-proven mainframe circuitry returned during past upgrades of 3000CX computers with new components and peripherals. The result is a new, low-priced computer system for data management equivalent in power to the minimum HP 3000 Series II Model 6," says HP.

The HP 3000 Series 1, with a standard 7290 disk, has proven performance increases of 10% to 50% over the earlier 3000CX, says HP, yet it's priced as low as 31% less than the fancier model. It also runs HP software, such as COBOL, Basic, Fortran, and the successful IMAGE 3000 DBMS program. The 3000 Series I can control as many as 16 terminals at once.

The concept of recycling turned-in CPUs is not new -- mainframers do it all the time -- but the repackaging of returned minicomputers is a less likely phenomenon because of the industry's purchase-only orientation and the constant drop in prices. But the idea has merit. HP squeaks a little more profit out of the 3000CX . . . and users get an ersatz 3000 Series II at lower cost.

were designed, new OEM applications will use the new products. Thus, Computer Automation will continue to manufacture both families.

OEM health

For all the shift of minimaker emphasis toward the end user -- either through product orientation like that of the CS/40 or through separate marketing enterprises like Computer Automation's SyFA Division -- the OEM market for minis remains strong. Garnering $745 million of minicomputer shipments in 1976, the OEM sector is expected to grow to $1,745 million by 1980. Thus while the percentage of mini shipments to OEMs (by value) drops a percent or two to about 35% of total mini shipments in 1980, overall market growth will continue.

Current trends, noted by analysts at IDC's annual briefing session earlier this year, pointed to continued health for the OEM minicomputer business:

- The OEM pipeline is filled, with little inventory buildup . . . producing order and shipment increases as needs increase.
- Microprocessors are complementing -- not competing with -- minicomputers in OEM products. The larger mini houses have full, compatible product lines extending down into microprocessor realms.
- International OEM business -- only 38% of 1976 shipments -- is continuing to grow.
- Minicomputer manufacturers are continuing to integrate vertically in peripherals, terminals, and components; mergers, such as DCC into Data General and Varian into Sperry Univac, are taking place.

In addition, the end market for the products made by the minimakers' OEM customers is booming. Small business systems and distributed processing devices -- often with minis as CPU or controller -- are forecast for high growth. (Forty percent of OEM mini shipments now go into products for the small business/DDP computer market.) In short, it's business -- good business -- as usual in OEM minis.

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Finish work

SYSTEMS HOUSES RIDE THE CREST OF THE MINICOMPUTER WAVE PROVIDING OUTLETS FOR MANUFACTURERS, DEVELOPMENT FOR USERS

Systems houses are the sartorial component of the OEM industry. They tailor "raw" EDP material -- CPUs, peripherals, and software -- into systems for the end-user. Minicomputers are generally at the heart of these systems because they are easily incorporated into a variety of configurations . . . performing a myriad of tasks ranging from simple accounting, data retrieval, and inventory, to managing complex communications and distributed data processing networks. Systems houses usually buy their hardware in large volumes, and hence receive discounts of 30%-50%.

But it's a symbiotic relationship . . . most minicomputer and peripheral manufacturers depend on the systems houses to integrate their assorted hardware into complete systems, to add or develop the proprietary software, and to act as distributors for the packaged product. As such, systems houses not only fill orders, but also keep in constant touch with users' needs by seeking and developing new markets that can benefit from total systems. Indeed, many OEMs field test their new products and configurations through systems houses to test marketplace demand before investing large amounts of capital in full production.

When Data General developed its CS/40 (see page 1) with COBOL, it wanted to determine the configuration's ease of programming . . . so the NOVA-based system was sent to a local systems house to "learn" a few standard applications programs. When the systems house reported that software implementation was, in fact, easier with the COBOL than previous high level languages, the minimaker cranked up its production line.

This cooperation and feedback arrangement propitiates the continued development of efficient, marketable systems that generate healthy revenues for both manufacturers and systems. In a recent nationwide survey of 1,600 systems houses by IDC, publisher of EDP/IR, it was found that in 1976 25% of the surveyed systems houses had sales in excess of $10 million. In addition, 41% of those surveyed spent over a half million dollars apiece on hardware acquisitions. Prices of the packaged systems ranged from $1,000 to over $250,000 . . . though almost 60% sold for over $50,000.

Systems houses can be divided into three categories:

1) Systems integrators -- these firms utilize a number of individual components from different manufacturers to build complete packaged systems, then develop or apply the necessary software. The majority of the surveyed systems houses fall into this category.

2) Value-added integrators -- these firms also rely on a variety of components from different manufacturers in creating their systems, but in addition, they manufacture some of their own peripherals, as well as develop or add software programs. About a third of the systems houses in the survey operate in this manner.

3) Turnkey system suppliers -- these firms buy a complete system or configuration from one manufacturer, and simply develop or apply the proprietary software for the desired applications. Just over 10% of the systems houses surveyed perform this service.

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Many systems houses adopt different development strategies (overlap categories) depending on the desired product, the OEM's hardware, their own manufacturing programming, or designing capabilities, and the market picture. For instance, a value-added integrator might not manufacture any of the peripherals necessary for a particular user group's configuration . . . but if it's felt that the market is strong enough, it might integrate different manufacturer's components and develop the appropriate software. If this initial tack is successful and market expansion appears likely, it might begin producing one or more of the necessary components in house . . . assuming a normal value-added integrator approach.

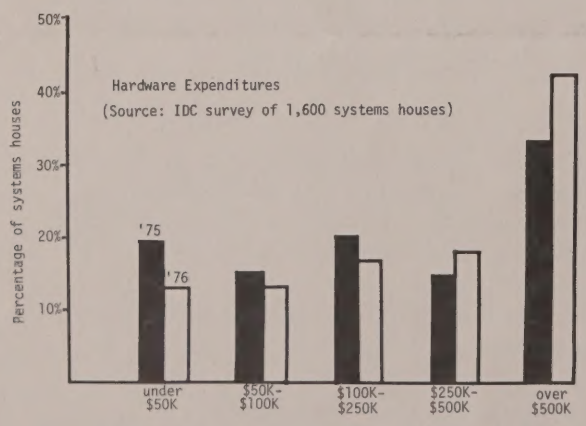
Nearly all systems houses act as distributors, although a few of the smaller ones rely on "subdealers." The vast majority of large systems houses are either systems or value-added integrators . . . this is slightly less true of small- and medium-sized firms. Users benefit from this approach because the dealers can select components from a wide range of products built by different manufacturers and thereby choose the best price/performance values compatible with the desired package. Moreover, value-added integrators can additionally cut costs on the peripherals they manufacture, but then users run the risk of losing some of the benefits of competition . . . the systems house is locked into its own hardware.

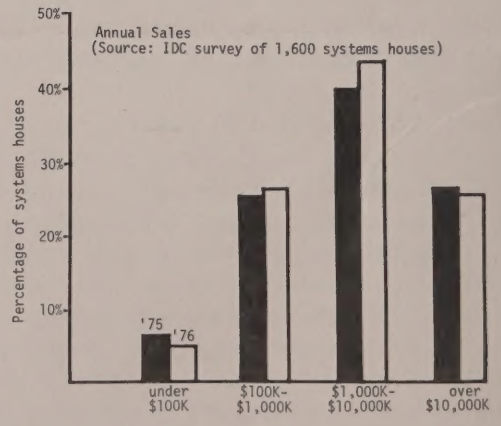
The advantage of turnkey systems is that they are often lower in price than comparably "integrated" systems, because all the components are from one manufacturer, and are usually supported by special discounts to the systems house. In addition, these components are often designed to operate compatibly at the production level, and hence there may be less maintenance problems. Turnkey systems often target first-time or unsophisticated users; as such, manufacturers tend to provide more technical support and training to their dealers, and many times grant them exclusive territories, as well as aiding in their capitalization efforts.

EDP's cottage industry

Systems houses are usually localized -- there is at least one in almost every state -- but California, New York, and Massachusetts support nearly a third of the 1,600 that were surveyed (it's estimated that there are about 2,000 systems houses in the U.S.). Many systems houses are relatively small outfits . . . 20% of those surveyed employed less than ten people, and nearly 50% employed less than fifty people. This size, as well as being localized, can be advantageous in reducing operating costs. Although a third of the surveyed systems houses

PERCENTAGE OF SYSTEMS HOUSES VS. HARDWARE EXPENDITURES & ANNUAL SALES





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employed over 200 people, these firms were almost all value-added integrators, and the numbers include their manufacturing and production staffs.

The diversity among systems houses is also reflected in the number of systems that had been installed as of December, 1976: 35% of those surveyed had installed less than ten, 29% had installed between ten and fifty, and 36% had installed over fifty. This is indicative of a rather young industry, and in fact, 75% of the surveyed firms had been operating for ten years or less.

An advantage for minimakers

As mentioned, the success of systems houses is inextricably linked to the minicomputer and peripheral manufacturers. So why don't the larger OEMs like DEC and Data General put together their own systems and develop the end-user software? . . . the answer is costs. For these production-oriented firms to expend time and energy diversifying or tailoring each of their products to fit a specific end-user or small group of users would cost too much money in programming and design expenditures because of their large overhead and operating expenses. Add to this the onerous burden of service calls to unhappy end-users, and it is easy to understand why the OEMs are content to concentrate on their profitable specialty -- manufacturing processing iron -- and "farm out" the headaches of software and system development to others.

In fact, DEC-manufactured CPUs are used by over 34% of the surveyed systems houses, while 19% opt for Data General CPUs, and 17% for Intel. The same three firms dominate the systems market penetration in main memory installations, but in peripherals such as line and character printers, disk drives, floppy disks, CRT terminals, paper tape, and magnetic tape, the penetration is more diffuse, with the exception of DEC products, which are at or near the top in all categories.

There is no doubt however, that when manufacturers identify an "operationally standardized" segment of the business or industrial community, they take advantage of it by designing a specific series with proprietary software packages. This has been the case with small business computers, which usually include a variety of programs -- but even these are limited to particular applications. Even IBM, which traditionally keeps all phases of manufacturing and development in-house, has found the systems house to be as much ally as competitor in marketing the System/32 . . . and with the Series/1, they're almost mandatory.

Filling in with microprocessors

With the falling prices and increasing technological breakthroughs in microprocessors (MPUs), new applications are constantly appearing . . . in intelligent terminals, in communications, in network architectures, in integrated systems, and in commercial products. Many of these applications will be packaged by systems houses; a few have already begun integrating MPUs into their system configurations, particularly in distributed processing and communications networks. MPUs are extremely effective as terminal controllers and as data control links. (They are also currently used in a number of electronic games, and should soon come into greater use in facsimiles, copiers, and microwave ovens.) Chip makers are increasingly targeting their products for specific functions that will be attractive to systems houses and other integrators.

For the time being, however, minis and miniperipherals will remain the mainstay of the systems house . . . and customer relations their principle strength.

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• "IS THERE REALLY A 3033 IN YOUR FUTURE?" That's the question IBM has begun posing to prospective buyers of the new processor after a rash of speculative orders substantially lenghtened the delivery date waiting list. As a result, some users have paid up to $50,000 to gain a higher position on the list — hoping that the 3033's firepower will offset the premium in those few months. IBM is asking customers to certify that they do indeed intend to use their 3033; it will be interesting to see who fesses up.

• NCR IS WASTING NO TIME WITH ITS SERIES 8000 . . . having just announced the I-8230, a 48K (upgradable to 96K) multiprogramming system. The basic configuration also includes: 5MB of disk, mag tape cassette, CRT, 55 lpm printer, and two additional communications channels. It sells for $28,600 or rents for $885 per month. The I-8230 caters to the first time user, but like all members of the 8000 series, it offers "migration path engineering" (EDP/IR,May 11,1977). A number of options, as well as a variety of industry-oriented applications, are available. NCR also announced new disks, band and matrix printers, and a multi-channel communications adapter.

• IS THAT A DISK JOCKEY OR A LEVEL 6? Honeywell has announced that Automation Electronics, Inc., has signed up for 50 Level 6 minicomputers to package with its own software to automate radio stations. Because of a recent FCC ruling, certain radio station transmitters are now open to automation . . . and AEI claims that "A station with an Autotron system can !ractically run itself."

• MY GOODNESS, IT'S ALMOST A COMPUTER! That's what users of Texas Instruments' new TI 58 and 59 handheld programmable calculators might well be saying soon. The calcultors come with plug-in, interchangeable "Solid State Software" modules containing up to 5,000 program steps each. TI has also unveiled the TI 57, a calculator with product features and self-learning materials for students and others to learn programming quickly; the TI 57, says the company, is the most powerful single chip calculator ever produced. The real kicker comes in the calculators' prices: $80 for the TI 57, $125 for the TI 58, and $300 for the TI 59. Industry sources indicate that these new systems put TI well in front of its handheld, programmable calculator competitors.

• TANDEM COMPUTERS HAS ADDED A DISK CONTROLLER TO ITS ARSENAL, the T16/3103 Dual Port Disk Controller, which can interface up to eight 200MB 3330-type disk drives to a Tandem "Nonstop" computer (EDP/IR,Dec.8,1975). The controller comes with a 4KB buffer and offers the same redundancy features as other Tandem products. In addition, the buffer now eliminates some processor-to-processor communication that was previously used to provide system redundancy.

• CONSOLIDATION AND REORGANIZATION IS IN THE AIR, and Control Data has followed the Jimmy Carter lead. The company announced earlier this month that it has created a new education company and consolidated all of its computer activities into one group. The third leg of the CDC stool is its financial wing, Commercial Credit. Last year CDC's revenues from computer activities were $1.35 billion (including education), from Commercial Credit $650 million.

• SOME THINGS TO LOOK FOR IN UPCOMING GRAY SHEETS: For one there's plenty more to be said about plug-compatible CPUs, now that CDC is in the act and another vendor will be introducing CPUs that are "IBM comfortable." Also, IBM's recent announcements on the 3270 and 3790 are interesting . . . and revealing.

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"THE GRAY SHEET" JUNE 8, 1977 • VOL.12,NO.23 P.J.McGOVERN,PUBLISHER

Toward distributed word processing

DIGITAL EQUIPMENT INTRODUCES A NEW WORD PROCESSOR IN A MARKET EXPECTED TO REACH $1 BILLION BY YEAREND 1980

Although most industry observers agree that data processing and word processing are moving closer together and that networks will eventually tie the two together — as they someday must to integrate such functions as electronic mail, microfiche generation and filing, etc. -- "total information processing" is still a concept looking for a proper application.

Last month, however, Digital Equipment Corporation announced a word processor it hopes will help that concept find that application. Packaged around a new single-chip microprocessor version of the PDP-8, the WS78 is a 16K system that can function as either a standalone video display word processor or as an interactive, shared logic system running off a PDP-11 (with appropriate software). Although DEC tried to arbitrate that tricky data processing/word processing once before with the DECsystem 310W introduced in February 1976 . . . the WS78 may well meet with greater user acceptance:

- At its simplest, the WP/DP tie is not at the user level . . . the workstation is dedicated to word processing. Only in network configurations using the PDP-11s might DPers and WPers both use the system -- and the operations should be transparent to each other.

- WS78 predecessors generally had a higher price tag relative to standalone competitors, but with a $13,990 price tag (30% lower than DEC's previous entry-level WPs) the WS78 is quite competitive.

- The WS78, with its tie-in to other DEC products, bespeaks a commitment to word processing that users weren't always sure was there with the company's previous WP entries.

Because the WS78 can straddle the standalone/shared logic categories of WP, DEC can tout flexibility and upgradability as a selling point. Indeed, the minimaker is definitely targeting both segments of the market. The WS78 is priced at below comparable standalone systems offered by the leading WP vendors (IBM, Redactron, Xerox, CPT, Savin, and Lexitron) . . . yet it offers the upgradability to shared logic networks. And at $4,750 (sans printer and floppy disk), used in such nets it should capture the fancy of at least some of those 39,000 PDP-11 users.

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THE OTHER SIDE OF THE COIN

The same processor powering the new WS78 will also be the computing engine for a new diskette-based computer system, the DECstation, priced less than $8,000. It will employ the single-chip PDP-8 version integrated into a video terminal, the VT78. Into this central system will hook a dual station floppy disk drive and other peripherals -- through five ports in the back of the device.

Software will include Fortran IV and Basic compilers and an OS/78 executive program resident on floppy disks. Special programs can be read into the VT78 terminal via a special "program injection" module that attaches to the terminal. The DECstation is software-compatible with the PDP-8 . . . allowing users to partake of the many programs already in existence for that mini.

The DECstation will be marketed to OEMs and large end users and could find use, says DEC, as nodes in DDP networks, as timesharing terminals, as data collection devices, and as computers in applications requiring more power than programmable calculators . . . and, naturally, in word processing.

In its standalone configuration, the WS78 comes with a 1920-character display, dual floppy disks, the 16K CPU with software, and either a 45 cps (Diablo) letter-quality printer or optional 180 cps LA78 "draft" printer. A communications option -- to other WS78s as well as to PDP-11s -- is available for $500.

In a shared logic system, the terminal portion of the WS78 (the WT78) interacts with the PDP-11 through special PDP-11 software running on the RSX-11M operating system. A PDP-11/70, says DEC, when supported by 88MB of disk, can support 48 WT78s or WS78s. A PDP-11/60 will be able to support 32 terminals, an 11/34 16. With access to the minicomputer storage capacity, the WS78 can be configured in distributed word processing systems . . . providing users really want such configurations. DEC feels they do . . . or at least will.

Resistance to computer-based WP

Ever since word processing got its start with the IBM Mag Card systems in 1969, computer manufacturers have tried to link it to DP . . . but it's been a shotgun wedding at best. Shared logic (mini-based) systems currently hold less than 1% of the installed WP base; in-house computer systems running WP applications hold less than 5%. According to recent IDC statistics, standalone WPs account for about 90% of over 250,000 WP keyboards in use at the end of 1976. For most users computer-based WP systems offer little advantage (except where large text storage/display is needed) over standalone types. The inconvenience of dealing with standalone media can be minor compared to the impediments to implementing computer-based systems:

- Host computers may not be optimized for interactive, on-line use, or may not accommodate existing WP software, thus needing extensive custom development to implement WP.

- Organizational problems easily arise between office staff and computer personnel who must share computer time.

- More sophisticated text editing features or WP applications, because of increased complexity, can place inappropriate demands on clerical workers. Human factors are paramount in word processing.

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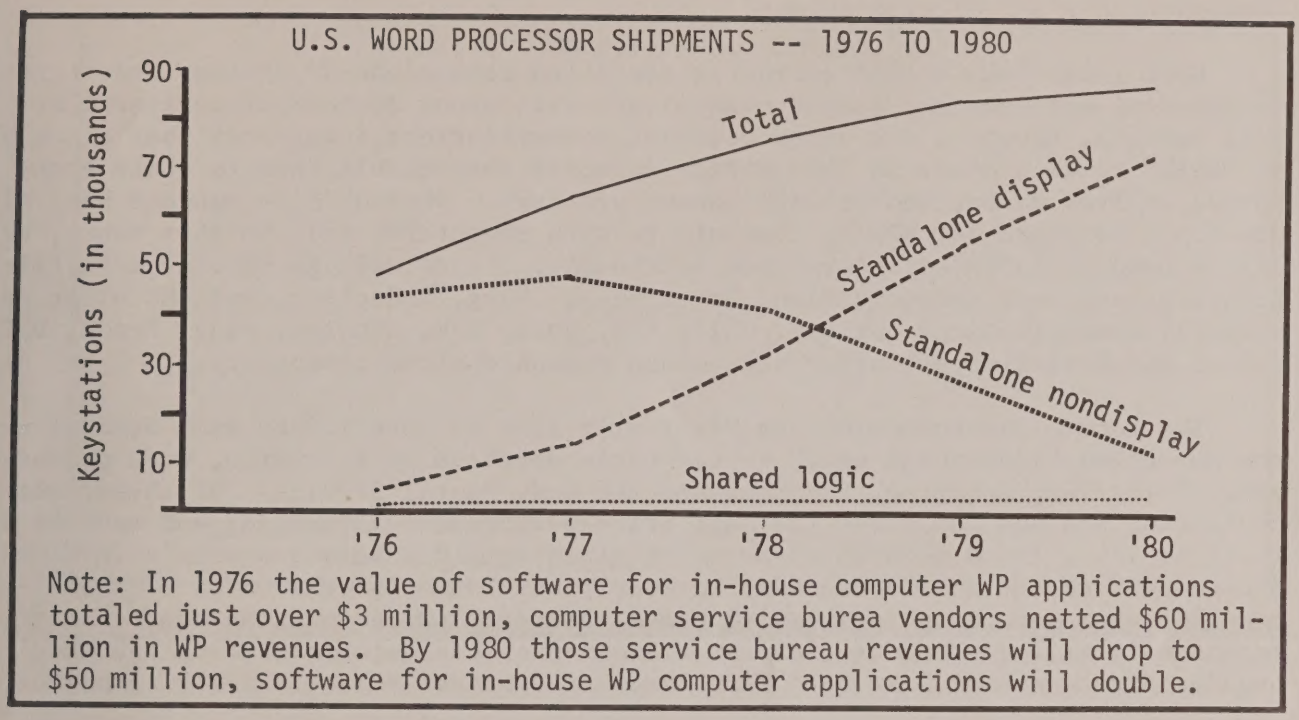

Note: In 1976 the value of software for in-house computer WP applications totaled just over $3 million, computer service burea vendors netted $60 million in WP revenues. By 1980 those service bureau revenues will drop to $50 million, software for in-house WP computer applications will double.

- In an on-line WP network, failure of the computer system means failure of the operation; not so on standalone systems (with compatible media).

An overview of WP

There is no doubt that the WP market is still wide open. Prices are continuing to fall in microprocessor-based systems, enhancing the attractiveness of the standalone units. (It's been estimated that even simple WPs can pay for themselves in less than two years with operating efficiency, especially in the face of increased clerical costs.) According to a recent study by IDC, the number of specialized -- standalone and shared logic -- system shipments will double by 1980, rising from almost 50,000 in 1976 to 90,000. Dollar value will climb from $400 million to over $1 billion. Market growth will be especially dramatic during 1977 and early 1978, particularly in WPs equipped with CRTs.

Display units, first introduced in 1973, will show the most dramatic jump in shipments . . . going from 12% of shipment value in 1976 to almost 90% by 1980. Nondisplay units will drop in shipment share accordingly. Shared logic systems are expected to increase in shipments at a steady 20% clip, gaining little in overall share of shipments because of total market growth.

IBM currently dominates the standalone market with three quarters of the worldwide installed value. It also holds the edge in packaged software value, media, and printer markets. Its Office System 6 is now a contender to set the standard in CRT-based standalone units . . . but it's somewhat topheavy in price and vulnerable to competition from a number of hungry vendors.

The WP industry is still young, and its growing pains are reflected in a 75% acquisition-by-rental rate. New technologies are still being developed -- users aren't quite sure which to hang their hat on -- but there are still unanswered questions about the adaptability of the office to true electronic word processing, the dissolution of the executive/secretary relationship, and about the sudden promulgation of efficiency and accountability in so human an operation.

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Communications and electronic mail

Most (over 90%) of the currently installed standalone WP systems are strictly independent machines and cannot communicate with other devices or peripherals. Most vendors, however, now offer optional communications interfaces that allow WPs to "talk" to each other in intraoffice networks that enable them to share workloads, deliver memos, and utilize common printers. Shared logic vendors have also developed software for WPs to communicate with computers, and, in this sense, WPs can be used as batch or interactive terminals . . . as well as sharing data files, printers, and more communications interfaces. Wang, Redactron, and DEC offer such computer communications options, while AES, Base, IBM, Linolex, Wang, Xerox, DEC, Vydec, and Redactron all offer standalone communications capability.

The future for communicating WPs really lies in interoffice mail deliver -- the so-called "electronic mail" -- currently serviced by facsimile, word processing, Telex/TWX, Mailgram, Faxgram, and the U.S. Postal Service. Of these, communicating WPs and fax offer the best price/performance advantages and ease of operations . . . and a modicum of security since outside operators aren't involved. A page of text can now be transmitted over phone lines in well under a minute -- becoming ever more competitive with postal service. Moreover, the cost of electronic mail will continue to fall as transmission technology improves and when broadband networks -- like Satellite Business Systems' -- are finally in place.

In short, the word processing market is in its adolescence in the U.S., its infancy abroad. For vendors, the decisions ahead will hinge on their perceptions of users' wants and needs and timing will be all important. DEC is confidant that its new offering is right on the button . . . just ahead of the crowd.

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Terminal hijinks

IBM SWIPES AT ITS 3270 TERMINAL COMPETITORS WITH PRICE CUTS
EDGES FURTHER INTO DISTRIBUTED PROCESSING WITH 3790 ENHANCEMENTS

It was not unexpected that IBM would tinker in some way with its family of IBM 3270 editing CRT terminals. The independents, with a market share that grew from 20% of the 3270 base at the end of 1975 to almost 30% last year (over a third of that was in intelligent emulation), represented a healthy portion of the base. Furthermore, with the overall market for editing CRTs -- about half of which goes to 3270-type devices -- expected to grow from 300,000 devices installed as of 12/76 to almost 700,000 by 12/80, the increased pressure from the independents -- and AT&T's recently legalized Dataspeed 40/4 -- militated a move by the Giant.

And, because of the nature of IBM's 3270 customer base -- over 90% use the clustered 3270 version, according to one IDC study -- and the technology offered by the independents, it was expected that the controller would somehow be involved in any enhancement. The independents have been squeezing their own costs and grooming their own product lines with this in mind.

But when the new controller arrived, its announcement was quickly overpowered by the sound of another shoe dropping . . . more IBM price cuts:

- Existing 3270 products were cut in rental and purchase prices by 16%; maintenance for some products increased 15%.

- New 3270 configurations can cost up to 50% less than comparable older products at the old prices; CRT display prices are especially impacted.

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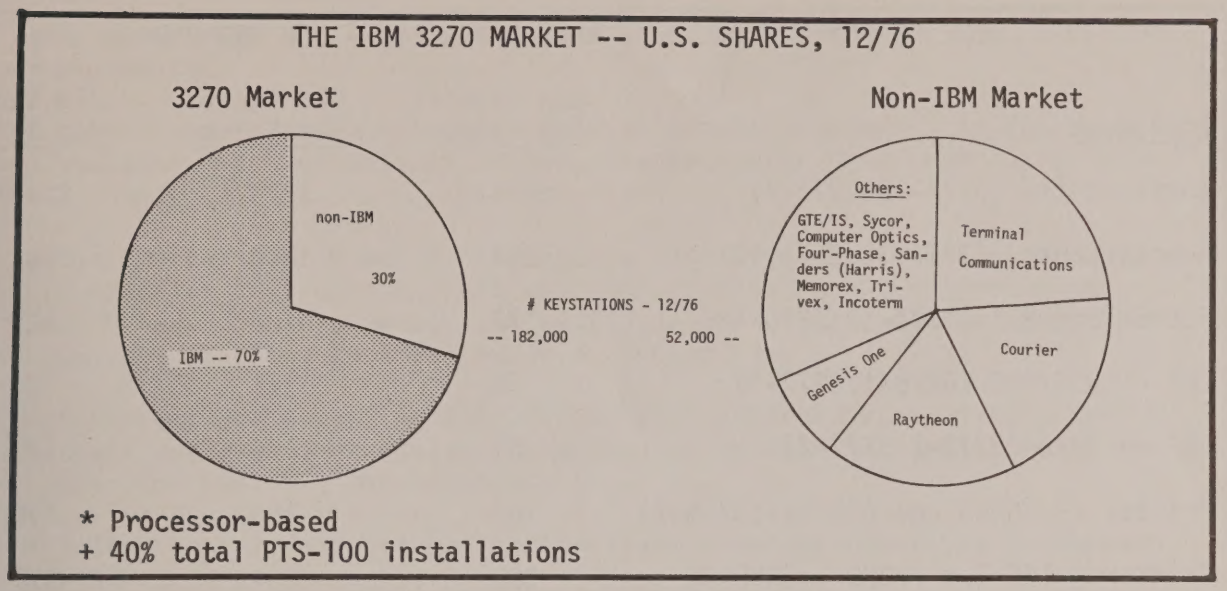

In response, four independent 3270-type terminal makers — Memorex, Courier, Raytheon, and Genesis One -- have announced price cuts or intentions to cut them. Most of the others have theirs under review . . . more cuts could be on the way.

While the independents can take heart from the fact that the IBM announcement means a possible extension of the 3270 product life . . . profit margins are bound to suffer. Especially impacted will be those, like Memorex and Genesis One, with products that plug to IBM's controller. Even assuming they can be connected to the new IBM controller, the CRT price cuts will take their toll. Vendors with programmable controllers of their own should be able to offer emulation of the new 3270s, perhaps with less impact on margins.

The 3270 midlife kicker

The main features of the new IBM 3270s, which are compatible with predecessor models and can be intermixed on the same communications lines with them, are the:

- 3274 control unit — capable of handling 1 to 32 devices, 16 of which may be the older 3270s. The 3274 hooks to a 370 CPU either locally or remotely using Bisynch or SDLC protocols, or to a 360 using Bisynch.

- 3276 control unit display station — which controls up to 7 3278 displays or 3267 printers. The 3276 comes in four screen capacities (960 to 3440 characters) and links to a host similarly to the 3274.

- 3278 display station — which operates with either controller and comes with the same screen capacities as the 3276.

- 3287 printer — a bidirectional serial matrix printer with speeds of 80 or 120 cps. It can attach to the existing 3271 and 3272 and the new 3274 and 3276 control units.

- 3289 line printer — which attaches to the 3274 and can print from 80 to 400 lpm depending on model and character set.

The new controllers, says IBM, can also attach to System/3s under bisynch; and the new 3276 controller/display station can link to a 3790 system controller. The larger display capacities for the CRTs make use of the same size screen as older 3270s, and the devices can be set up or relocated by users.

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SOME REPRESENTATIVE 3270 RENTAL PRICES -- NEW AND OLD

Equipment	New Equip. New Price	Old Equip. New Price	Old Equip. Old Price
Local Contr. (3274-1B:3272-2)	$490/m	$179/m	$213/m
Remote Contr. (3274-1C:3271-12)	344	203	284
Standalone Sys (3276-12:3275-12)	172	186	222
CRT -- 960/480 (3278-1:3277-1)	58	71	84
CRT -- 1920 (3278-2:3277-2)	61	103	123
Printer -- 80/66 cps (3287-1:3286-2)	167	150	179
Printer - 120 lpm (3289-1:3288-2)	368	384	427

Note: Features needed for congiguration (adapters, etc.) tend to be less expensive on the new systems; also note that despite the higher controller costs, clustered system economies can begin to appear with as few as 5 CRTs on a controller. Considering the added capabilities of the new models -- many whose top ranges aren't represented here -- the IBM announcement is a packed one.

A small installation with a 3276, three 3278s, and a 3287 will cost $642 a month to rent, $546 to lease, or $23,695 to purchase. In contrast, a comparable setup of existing models, says IBM, would cost 34% more to rent or lease, 15% more to purchase. At the old prices, the configuration would be 35% more expensive to purchase, 61% more to rent. The economies are only slightly less dramatic at the higher end. A large local cluster of devices, including a 3274, twenty 3278s, and three 3287s will rent for $2,571 monthly, lease for $2,187, or cost $95,945 to buy. Existing products in the same setup would cost 29% more to rent (42% under the old prices), 8% more to purchase (26% under old prices).

Besides the new prices -- and the availability of two-year leases -- the principle differences between the old 3270s and the new include:

+ The new displays, which can accommodate almost twice as many characters on the same size screen as the 3277; the new printers, which more than double possible print speeds.

+ The fact that the standalone model (3274) can accommodate more than one display; also, a flexible disk drive has been added to the controller for the loading of communications routines.

The 3790 enhancement

With a current estimated worldwide population under 1,000, IBM's 3790 communications system has been less than a booming success. Drawbacks included its price and its lack of local programmability (programs had to be compiled on host 370s) But IBM has slowly been fine tuning its "distributed processing" system -- adding function, communications and access, program support -- and industry observers expect that more aggressive marketing and support for the 3790 is imminent.

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And, along with the 3270 announcement, IBM took a step in that direction. The enhancements:

- Remote communications is now possible between the new 3270 display stations and the 3791 controller; theoretically, 200 CRTs can be attached to a 3791.

- The smaller 3791 Model 1 controllers have been superceded by a 10MB controller that can be field upgraded to Model 2 controllers with 20MB and 30MB or storage. In addition, control storage in the 3791 has been tripled from 65K words to 196K words.

- A Display Management System/3790 program product helps users generate their own 3790 applications programs and handles communications between the 3790 and the host computer.

- Lease, rental, and purchase prices were reduced, resulting in system reductions of about 28%.

(Earlier this spring, IBM added communications and local programmability to its key-to-disk version of the 3790 -- the 3760/3790 -- and extended its attachment capability to include the 370/115.)

At the same time it announced the new 3270s and enhancements of the 3790, IBM also consolidated its 3770 line of keyboard/printer terminals, pruning the 3773 from the family and cutting the nonprogammable 3774s and 3775. IBM also enhanced the programmable communications and RJE capabilities of the family under SNA and dropped lease, rental, and purchase prices on the systems about 22%

The obsoleted terminals will not be sorely missed . . . IDC estimates that as of yearend 1976 the 3771/3/4/5 accounted for only 5% of all keyboard/printer terminals (1,500 units). The 3776/7 remote-batch terminals held a similar percentage of a population of approximately 15,000 remote-batch terminals. To make it easier for customers who have already installed the obsoleted terminals, IBM is offering low-cost emulation support on the remaining 3774/5 models.

Terminal interpolation

To EDP/IR, IBM's overhauling of its data communications terminal lines has the earmarkings of something more than routine product enhancements:

+ The pricing seems more than a simple response to production economies (as perhaps memory price cuts were). Competitive factors appear to have been taken into account . . . almost with a vengence.

+ The increased capacities/floppy disk storage for the new controllers adds flexibility for future changes . . . a flexibility that isn't likely to remain fallow for long.

+ IBM's increased focus on data communications/distributed processing products bespeaks future product emphasis.

As one of IBM's 3270 competitors said almost jokingly to EDP/IR, "How do you stop IBM? You don't. They can do anything they want -- they have the momentum." And momentum is a vector quantity . . . it has direction.

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• MORE ENTRIES FOR THE DISTRIBUTED PROCESSING DERBY: Harris Corp. has introduced three new processors in its 1600 Series of remote-batch terminals, two new key-to-disk software packages, and extra 64KB-98KB memory for them. One of the new processors, the 1650, is aimed at key-to-disk data entry work, another, the 1660, performs a mix of RJE, batch COBOL, key entry, and interactive applications. The third is a dual processor that enables users to combine any two 1600 models into a single system. Lease prices for the new systems range from $1,1770 to $3,572/month; purchase prices go from $60K-$128K.

Raytheon has doubled disk storage and added mag tape capability to its PTS-1200 clustered processing system. The new disk, says the firm, will lower the cost of storage by nearly 50% while increasing the capacity from 20MB to 40MB. Access times on the new disk systems are three times as fast as on older systems, and while prices will vary depending on specific configurations, Raytheon pointed out that 20MB of new disk will cost 45% less than old disk. The mag tape system includes a controller that can handle 1-3 800 bps drives ($11,000-$25,000), and "in some applications," says the firm, "can lower communications costs."

Inforex added the System 1330 to its popular line of 1300 key-to-disks "for users who wish to consolidate their remote job entry and batch data entry applications." At the heart of the 1330 is a 48KB mini able to control up to 16 workstations; disk storage can run from 10MB to 40MB, various tape storage and printer units are available. Inforex offers some datacomm costs saving features, including data suppression, job queuing for unattended operations, and tape spooling, which allows remote printing of blocked data onto tape before printing. An entry-level 1330 leases for $1,350 a month.

• SATELLITE BUSINESS SYSTEMS GOES UNDER THE MAGNIFYING GLASS . . . the Department of Justice has filed Civil Investigative Demands with the firm. The demands will request documentary material going back to SBS's antecedents, CML Satellite and MCI Lockheed Satellite Corp., and will attempt to determine whether or not there has been or may be a violation of the antitrust laws in SBS's formation. Apparently, the DOJ wasn't satisfied with the FCC approval of SBS's proposed Domsat system without full evidentiary hearings on antitrust implications. SBS and its parent companies are more that miffed at the DOJ, and IBM, at least, is mulling over its course of action. SBS says the demands will most likely not impede progress toward establishing its satellite system.

SBS's latest step in establishing that system came last week when the company issued a request for proposals for the design and construction of the radio frequency (RF) terminals for the system. The RFP referred to four types of terminals -- two with 5-meter antennae, two with 7-meter dishes -- and for planning estimate quotes on up to 500 additional RF antennae. Normally referred to as the proverbial "rooftop antennae," SBS earth stations, said the company in its release, will be provided "at each customer's traffic concentration points in order to create fully switched private networks." Each station will consist of an RF terminal, a high-speed time division multiple access modem, and a satellite communications controller.

• MORE MERGERS AND ACQUISITIONS: Litronix has announced that Honeywell has made a buy-up bid, pending court approval (Litronix is in Chapter XI), Storage Technology and Memorex are in the preliminary stages of merger talks, Sperry Rand has agreed to make Varian part of its Univac subsidiary, and Datatrol is going through with its buy-up of Adressograph-Multigraph's AMCAT EFTS terminal business. There's always something going on in this industry.

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